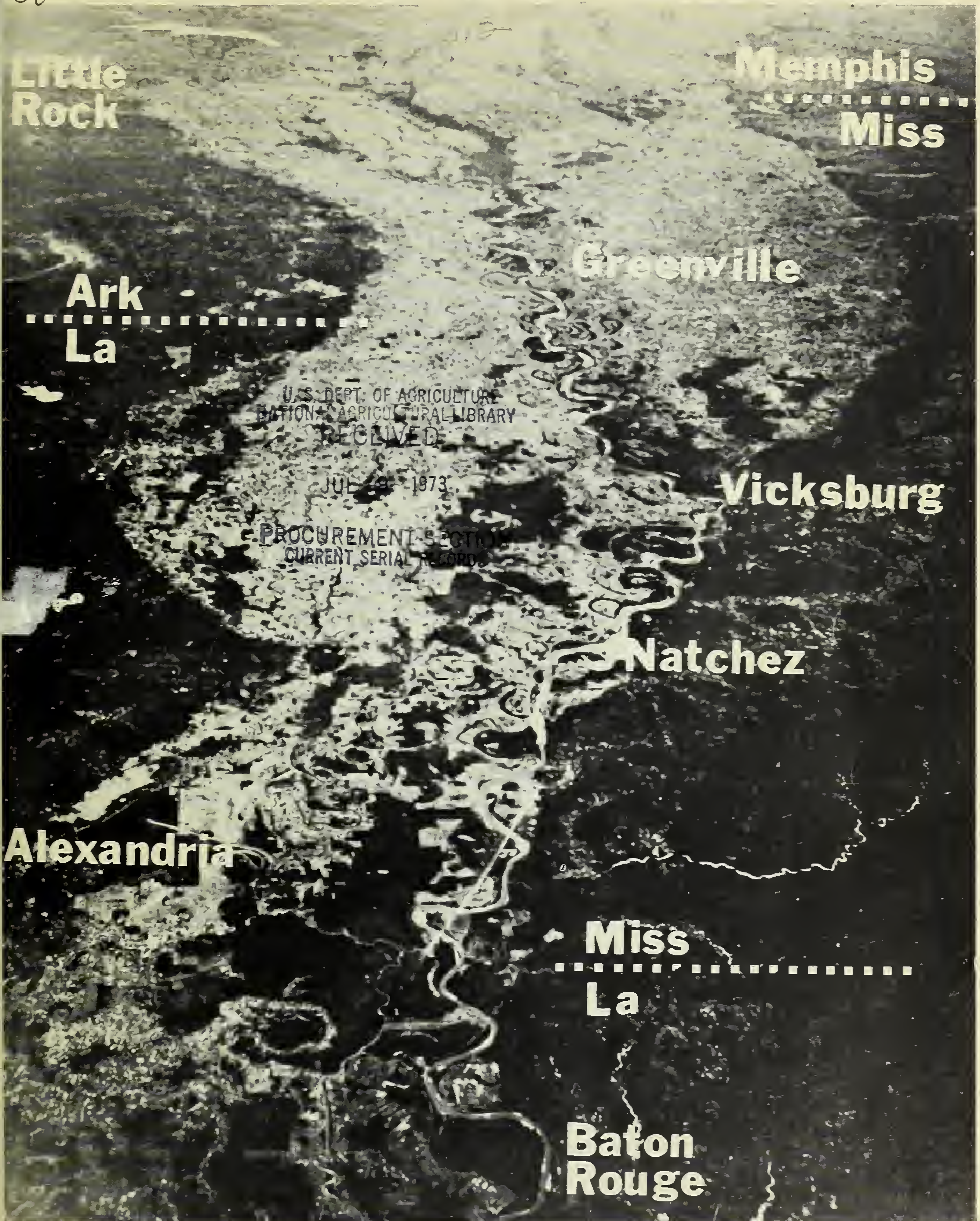
A MONOGRAPH OF THE SOILS OF THE SOUTHERN MISSISSIPPI RIVER VALLEY ALLUVIUM



Arkansas, Mississippi, and Louisiana Agricultural Experiment Stations in cooperation with the Soil Conservation Service, U. S. Department of Agriculture.

SOUTHERN COOPERATIVE SERIES BULLETIN 178

COVER PHOTO

Aerial view of the Lower Mississippi River Valley Alluvium from Northern Arkansas to Southern Louisiana as taken by NASA satellite. Acknowledgment and appreciation are extended to NASA for permission to reproduce this photo (NASA Photo Frame No. A 59-23-3454). Appreciation is also extended to Fred Robinson, Graduate Assistant, Agronomy Department, University of Arkansas, for assistance in preparing the photo for printing.

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A Monograph of the Soils of the
Southern Mississippi River Valley Alluvium
Southern Cooperative Series Bulletin 178

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by
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PREFACE

Bulletin 178 is a Southern Cooperative Series publication prepared through the cooperative effort of the Agricultural Experiment Stations of Arkansas, Mississippi, and Louisiana and the Southern Regional Soil Survey Group of the Soil Conservation Service, U. S. Department of Agriculture. Copies may be mailed under the frank and the indicia of each agency.

Requests for copies of this publication from states outside the cooperating states should be addressed to the editor, Arkansas Agricultural Experiment Station, University of Arkansas, Fayetteville, Arkansas 72701. The price per copy is $1.75.

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A Monograph of the Soils of the Southern Mississippi River Valley Alluvium

SUMMARY

This monograph of the Southern Mississippi River Valley alluvium soils was prepared by the cooperative efforts of research personnel of the Agricultural Experiment Stations of Arkansas, Mississippi, and Louisiana, and the Southern Regional Soil Survey Group of the Soil Conservation Service. Planning was initiated within the technical committee of the Southern Regional Project S-14 and completed under the Regional S-60 project.

The monograph includes a description of the region, characterization of representative soil series, classification and delineation of the soil associations with interpretations and limitations for the use of these soils for farm and nonfarm purposes. The region extends for about 600 miles from Cairo, Illinois, to the Gulf, south of New Orleans, Louisiana. The area ranges from about 25 to 125 miles in width and encompasses about 20 million acres of alluvium-derived soils. It represents one of the most fertile and productive agricultural areas in the United States.

The elevation decreases from about 350 feet above sea level in the northern extremity to below sea level in some areas in the vicinity of the Gulf. The climate varies from continental at the higher elevations in the north to semi-tropical in the southern extremity. The long-time mean annual temperature and precipitation for Sikeston, Missouri, are 48°F and 48 inches, respectively, while in New Orleans the values are 70°F and 63 inches. Despite adequate annual precipitation, the erratic distribution of rainfall during the March-to-October period makes supplemental irrigation and land leveling necessary for sustaining a high level of crop production.

The soils of the region were characterized by selection of pedon sites embracing 32 representative soil series in Arkansas, Mississippi, and Louisiana. For each soil series the profile was described and sampled in accordance with standard procedures used by the Soil Survey Group of the SCS. Analytical data describing the physical, chemical, and mineralogical properties of each horizon for each pedon-site are included. Soil associations occurring in the region are shown and described in a general soil map of the region. The manner in which each soil series fits into the new comprehensive classification system is described in a separate section of the report.

The physical, chemical, and mineralogical data for the soils of the region very dramatically illustrate the range in properties of soils that have developed from alluvial sediments. The textural characteristics vary from loamy sands to clays, with the coarse-textured soils close to the original stream bed while the clay soils occur in areas more distant from the stream bed source. The greater proportion of the productive soils lie between these extreme textural variations.

Management and tillage problems are chiefly associated with the extremely coarse and fine-textured soils. Problems associated with tillage and seedbed preparation in the clay soils have been partly solved; however, certain aspects continue to represent a major problem that needs attention. While pan formations occur in the soils throughout the region, they have limited crop production to a significant degree only in local areas. Subsoiling and chiseling operations have been successful in increasing crop yields temporarily in a limited number of areas of the region.

The relatively flat topography associated with most soils of the region gives rise to a significant problem in water drainage. The problem is complicated by surface drainage and internal drainage within the profile. Despite land leveling for easy removal of surface water, the local drainage system is frequently the limiting factor in removal of excess surface water. Poor soil permeability within the profile is common among soils that have a dense or clay subsoil; it represents a complex problem that has not been completely solved.

From a chemical standpoint the soils of the region are adequately supplied with nutrients, with only moderate amounts of nitrogen, phosphorus, potassium, and calcium required for excellent crop production. In most of the soils, pH is within the limits for excellent crop yields; except for the clay soils, liming has been effective in maintaining the proper soil pH and supply of calcium. The problem of sodic soils is primarily associated with the Foley and Lafe series where sodium has accumulated to 15% or more of the

exchange capacity of the soil. Approximately 1 million acres of these soils exist in Arkansas and represent a problem that needs attention.

While the organic matter content of the soils in the region has reportedly declined by as much as 50% during the last 75 years of cropping, the content is still high relative to non-alluvial soils of the region. The value of added organic matter is recognized; however, until the practice becomes economically feasible practices that increase the organic matter content of the soil will be practiced by a limited number of farmers.

The clay fraction of the soil is made up of an assortment of clay minerals. The coarse clay fraction contains a predominance of montmorillonite with small amounts of kaolinite and illite; the medium-fine fraction, illite and montmorillonite; and the very fine clay fraction, montmorillonite, interstratified clays, and amorphous compounds. Region-wise, the clay mineral composition is quite similar.

The physical, chemical, and mineralogical properties of selected soils of the Southern Mississippi River Valley alluvium offer a quantitative characterization of the soils of the region in terms of their capabilities and limitations for both farm and nonfarm enterprises. Limitations in their usage have been cited in detail and indicate that great care should be taken in evaluation of the soil properties and their suitability for the planned use.

The Soil Association map along with the accompanying discussion on soil genesis and the new comprehensive soil classification system afford a better appreciation of the great contribution which this soil region is making to the agricultural production of the United States.

INTRODUCTION[1]

Overview of Study

Detailed characterization of the soils of the Mississippi River Valley alluvium was initiated in 1959 in Arkansas as part of the work of the Southern Regional Technical Research Committee (S-14). Initially five soil series were sampled on the east side of Crowley's Ridge in Mississippi, Crittenden, and Phillips Counties. Later four of these soil series also were sampled from the west side of Crowley's Ridge.

With the expiration of the S-14 project and the subsequent approval of a new regional project (S-60), it became apparent that to make the Arkansas data more meaningful, similar data for these soils in Mississippi and Louisiana were necessary. Thus, many of the same soil series were selected and characterized in Mississippi and Louisiana with the objective of publishing a subregional bulletin characterizing important soils of the southern Mississippi River Valley alluvium. During this period the Soil Conservation Service offered to join with the three states in the preparation of a more detailed soils monograph of the Lower Mississippi River Valley alluvium.

While the efforts of all parties have been long and tedious, they have been justified. The publication of a comprehensive characterization of the Mississippi River soils represents a major contribution to the understanding of the soils of an important agricultural area of the United States.

Significance of the Study

The Southern Mississippi River Valley is one of the most productive areas of farm land in the United States. It extends from its northern extremity at Cairo, Illinois, to the Gulf south of New Orleans, Louisiana, a distance of approximately 600 miles, and ranges from about 25 to 125 miles in width.

The southeastern Missouri alluvium area contains about 2.3 million acres representing 5.1% of the state's acreage. In 1964 it produced 13.4% of the state's farm receipts.[2]

Within the states of Arkansas, Louisiana, and Mississippi the valley encompasses approximately 17 million acres of alluvium-derived soils with about 8 million acres in Arkansas, 4 million acres in Mississippi, and 5 million acres in Louisiana. The value of crops (cotton, soybeans, rice, grain, sugar cane, and pastures) produced on the alluvial soils of the three states exceeds the value of the crops produced on the soils of any other physiographic region within any of the states.

Despite a high level of production, the potential productivity of the region has not been realized. This failure has been due in many instances to extreme variations in the physical, chemical, and mineralogical characteristics of soils derived from alluvial depositions. While considerable progress has been made in correcting these adverse conditions, research workers have not been able to modify many of the physical and chemical properties that prevent farmers from obtaining the maximum production from these soils. Extremely formidable cultural problems associated with the clayey soils on the one hand and the sandy soils on the other hand still remain unsolved.

For example, the physical properties of the clayey soil series are revealed in the occurrence of hard cement-like aggregate with the presence of enormous cracks throughout the soil upon drying, but with an almost unmanageable "gumbo-structure" when saturated with water. Surface

1. D. A. Brown, agronomist, Arkansas Agricultural Experiment Station.

2. Private correspondence from C. L. Scrivner, Soil Survey Staff, University of Missouri, Columbia, Missouri.

and internal drainage of water is most difficult and seedbed preparation, cultivation, and irrigation become formidable chores. On the opposite end of the soils-spectrum are the coarse-textured soils which, in contrast to the clayey soils, exhibit almost no structure and are extremely low in water-holding capacity, highly leached, and most susceptible to droughts. In between these extremes exists a broad panorama of intermediate-textured soils with minimal physical problems. However, even in these soils many fertility problems are not yet solved, particularly those relating to crop response to fertilizers and lime applications.

While numerous Experiment Station publications and particularly soil survey reports by the Soil Conservation Service have dealt with the area on a county or parish basis they have not been able to present an overall characterization of the soils of the entire valley. Thus there is a real need for a comprehensive characterization of the properties of the Lower Mississippi River Valley soils. This regional research effort brings together into one publication descriptions of the physical and climatic features and the soil resources of the area. Morphological descriptions and physical, chemical, and mineralogical data for 32 representative soil series in the valley are presented, as well as a generalized soil association map of the entire valley with an accompanying explanation of how these soils are grouped into the new soil taxonomy scheme (7th approximation). Finally, pertinent interpretations of the data are presented to delineate the agricultural and non-agricultural capabilities of the soils in the region.

EXPERIMENTAL TECHNIQUES

Sampling Procedures

The extent of the study area is depicted in Figure 1. Pedon sites were selected to characterize five distinct areas within the region: (1) an area east of Crowley's Ridge in the northeastern part of Arkansas, (2) an area west of Crowley's Ridge in Arkansas, (3) an area south of Crowley's Ridge in Arkansas and Mississippi, (4) an area in the mid-section of Mississippi, and (5) and area adjacent to and southeast of Macon Ridge in Louisiana. Individual pedon sites were selected through the cooperative effort of personnel from the respective state Experiment Stations and representatives from the SCS including the State Soil Scientist, Area Survey Party, and the SCS Survey Laboratory and Correlation staff.

Soil characterization pits approximately 4 feet square and 6 feet deep were excavated to facilitate sampling and preparation of a morphological description. A detailed morphological study of each profile was made and a soil profile description was prepared following the criteria established by the SCS Soil Survey Correlation staff. Bulk samples were collected from each subhorizon, either undisturbed clods or core samples, for determination of bulk density and moisture-retention characteristics. Where possible bulk soil samples were taken from the underlying deeper portions of the C horizon. The bulk samples were distributed to each Experiment Station and in some cases to the SCS Soil Survey Laboratory at Lincoln, Nebraska, for detailed physical, chemical, and mineralogical analyses.

Physical Analysis

Particle size distribution of the Dundee and Commerce soils in Louisiana was determined by the pipette method of the Soil Survey Laboratory (7).[3] The remaining soils from Louisiana and Arkansas were analyzed by the Bouyoucos hydrometer method as given by Day (2). Mississippi samples were dispersed in sodium carbonate and separated by centrifuge (3).

Bulk density measurements of Arkansas and Mississippi samples were made on undisturbed cores, whereas Louisiana used the saran-coated clod method (4A1) of the Soil Survey Laboratory (7). Results are expressed on the field-state basis for Mississippi and Arkansas; Louisiana used the volume at 1/3 bar moisture in calculating bulk density.

Moisture retention values were determined using pressure membrane extraction techniques developed by Richards (6). Undisturbed cores were used for Arkansas and Mississippi soils, and Louisiana used the saran-coated clod method 4B1C (7). Moisture at 15 bar suction was determined on 2 mm sieved samples 4B2 (7).

Chemical Analysis

Exchangeable bases were replaced by leaching with N NH_4OAc at pH 7. Calcium and magnesium were determined by atomic absorption except for the Commerce and Dundee soils of Louisiana which were determined by EDTA titration. The CEC was determined in Arkansas and Louisiana by ammonium saturation, replacement of ammonia by Kjeldahl digestion, and titration of NH_3 collected in boric acid. In Mississippi the soil samples were calcium-saturated by washing with N $Ca(OAc)_2$ at pH 7, the excess salt was removed by alcohol-water washing, the calcium was replaced by N NH_4OAc, and calcium was determined by atomic absorption. The CEC also was calculated from the sum of the cations. Extractable acidity was determined using $BaCl_2$-triethanolamine at pH 8.2 as given by Soil Survey procedure 6H1a (7). Base saturation was calculated from the CEC (NH_4OAc). Soil reaction was determined

3. Numbers in parentheses refer to literature citations, which are included by sections in "Literature Cited", beginning on page 73.

SOIL SERIES STUDIED

ARKANSAS

1. Amagon ●
2. Arkabutla ●
3. Bosket ●
4. Dubbs ●
5. Foley ●
6. Rosebloom ●
7. Alligator ▲
8. Alligator ▲
9. Crevasse ▲
10. Dubbs ▲
11. Dubbs ▲
12. Dubbs ▲
13. Dundee ▲
14. Robinsonville ▲
15. Tutwiler ▲
16. Tutwiler ▲

MISSISSIPPI

17. Forestdale ●
18. Robinsonville ●
19. Tutwiler ●
20. Bruin ▲
21. Commerce ▲
22. Dundee ▲
23. Dubbs ▲
24. Dundee ▲

LOUISIANA

25. Alligator ●
26. Bruin ●
27. Commerce ●
28. Dundee ●
29. Goldman ●
30. Sharkey ●
31. Commerce ▲
32. Dundee ▲

● Pedons in Text

▲ Pedons in Appendix

— — — Boundary of Area Studied

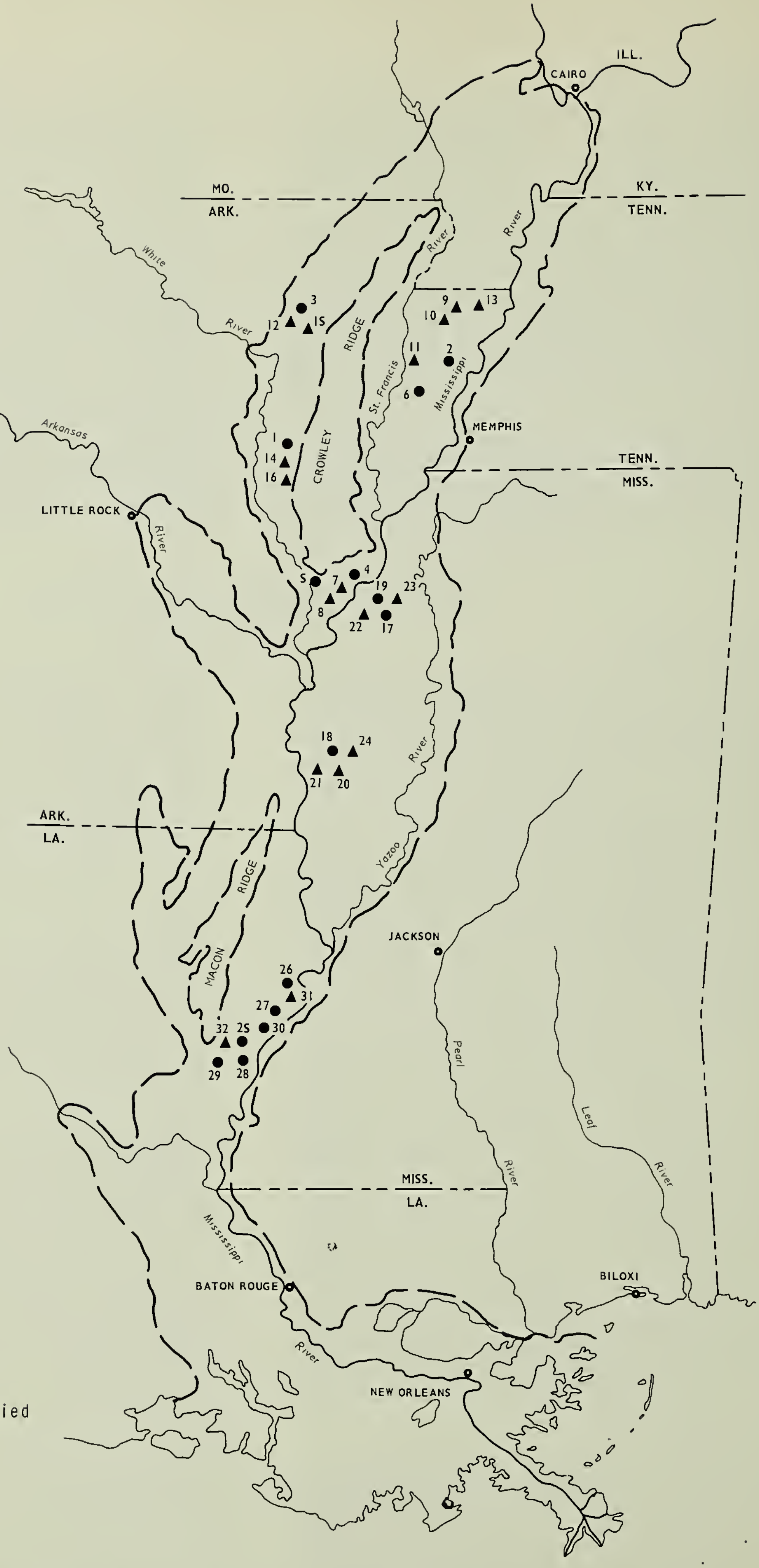

Figure 1. Generalized sketch of the region showing location of pedon sites.

in a solid :liquid ratio of 1 :1 using water or N KCl. Organic matter was determined by acid dichromate digestion methods with Louisiana using the Walkley-Black titration method (7) and Arkansas using a colorimetric procedure. Organic carbon was determined by dry combustion at Mississippi. Phosphorus was extracted by 0.03 N NH_4F - 0.025 N HCl solution (Bray and Kurtz No. 1) at Arkansas, and 0.1 N HCl - 0.03 N NH_4F (Bray and Kurtz No. 2) at Louisiana (4).

Mineralogical Analysis

Clay and silt samples were prepared for mineralogical analysis essentially as given in So. Coop. Series Bulletin 61 (5) and by Jackson (3). Oriented slides were prepared for X-ray analysis of potassium and magnesium (Ark. used Ca) saturated glycerol solvated clays. Potassium-saturated samples were heated successively to 325°C, 500°C, and 600°C. Interpretation of X-ray diffraction patterns was based on numerous published reports but of particular use were Jackson (3), Brown (1), and Whittig (8). The following abbreviations are used to designate clay minerals: K, kaolinite; V, vermiculite; C, chlorite; M, montmorillonite; I, illite; Q, quartz; F, feldspar; and A, amorphous. The relative percentage composition is indicated by numerals, 1 being 40% or greater, 2 being 10 to 40%, and 3 being less than 10%.

CLIMATE OF THE SOUTHERN MISSISSIPPI RIVER VALLEY[1]

From the northern extremity of the region (Cairo, Ill.) the elevation decreases from about 350 feet above sea level to below sea level in the southern extremity in the vicinity of New Orleans, La. With this change in elevation, the climate varies from an almost continental type of weather in the northern portion to a semi-tropical climate in the southern portion. The temperature, humidity, and rainfall for six locations are given in Table 1 (5,6,7,8,10,11,12,13,14). The trends in temperature and precipitation from the northern to the southern extremities are shown in Figure 2. These trends show that the weather changes gradually from moderate winters and hot summers at Sikeston, Missouri, to hot sultry summers and mild winters at New Orleans. The mean annual air temperature ranges from 59°F at Sikeston to 70°F at New Orleans. Mean annual maximum and minimum temperatures for Sikeston are 80° and 41°F, while for New Orleans they are 78° and 63°F, respectively. The mean annual precipitation increases from 48 to 64 inches between Sikeston and New Orleans.

1. D. A. Brown, agronomist, Arkansas Agricultural Experiment Station.

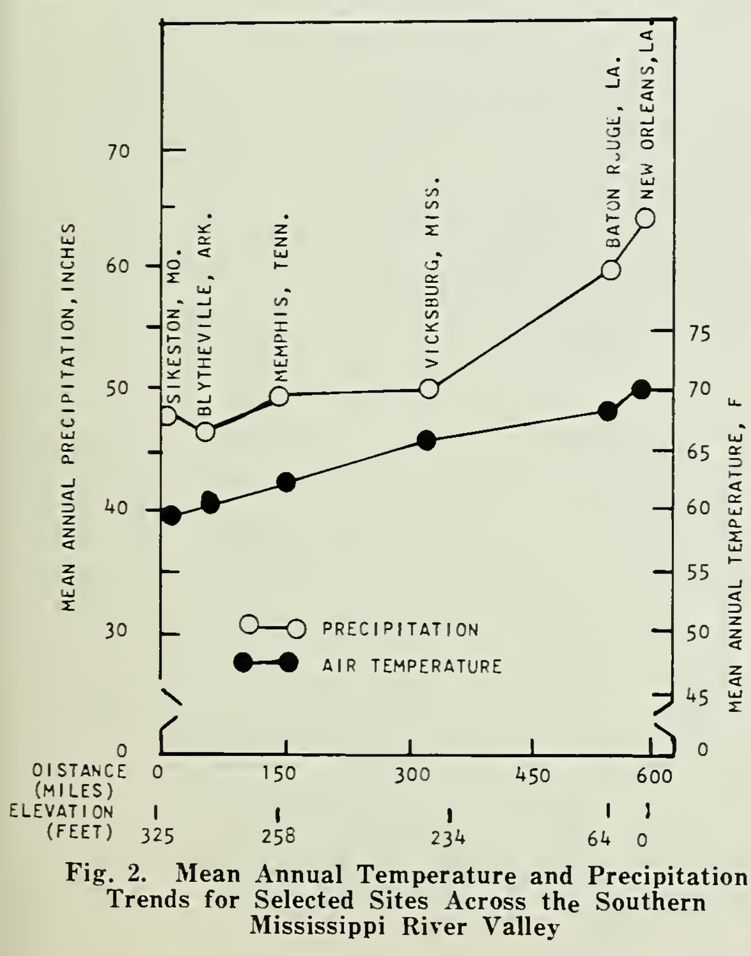

Fig. 2. Mean Annual Temperature and Precipitation Trends for Selected Sites Across the Southern Mississippi River Valley

The climatic trends in the northern portion of the lower Mississippi River Valley area are significantly different from those evident in the northeast portion of Missouri at Sikeston (Figure 3). While temperature patterns are similar throughout the year, they are considerably lower in the northern portion of the Mississippi River Valley at Sikeston. Precipitation in the Sikeston area is greatest during the March-to-May period and lowest during June to October, while in NE Missouri the lowest amount of rainfall occurs from November to February, and the period of May to September has the greater amount of precipitation (6). By comparison, the precipitation for the southern extremity of the southern Mississippi River Valley in the vicinity of New Orleans is highest during the July-August period.

While an annual rainfall of from 48 to 64 inches would appear to be quite adequate, the distribution of this rainfall during the cropping season (April through September) is so variable that supplemental irrigation as well as land leveling practices have proven to be indispensible tools for maximum and sustained crop yields in the region. (2,5,8,9,15,16). In 1959 Van Bavel published a comprehensive analysis of the drought and water surplus characteristics for the soils of the lower Mississippi Valley (16). Two aspects of his data are reproduced in Figure 4 to illustrate the effect of rainfall distribution patterns on the freqency of droughts and surplus water.

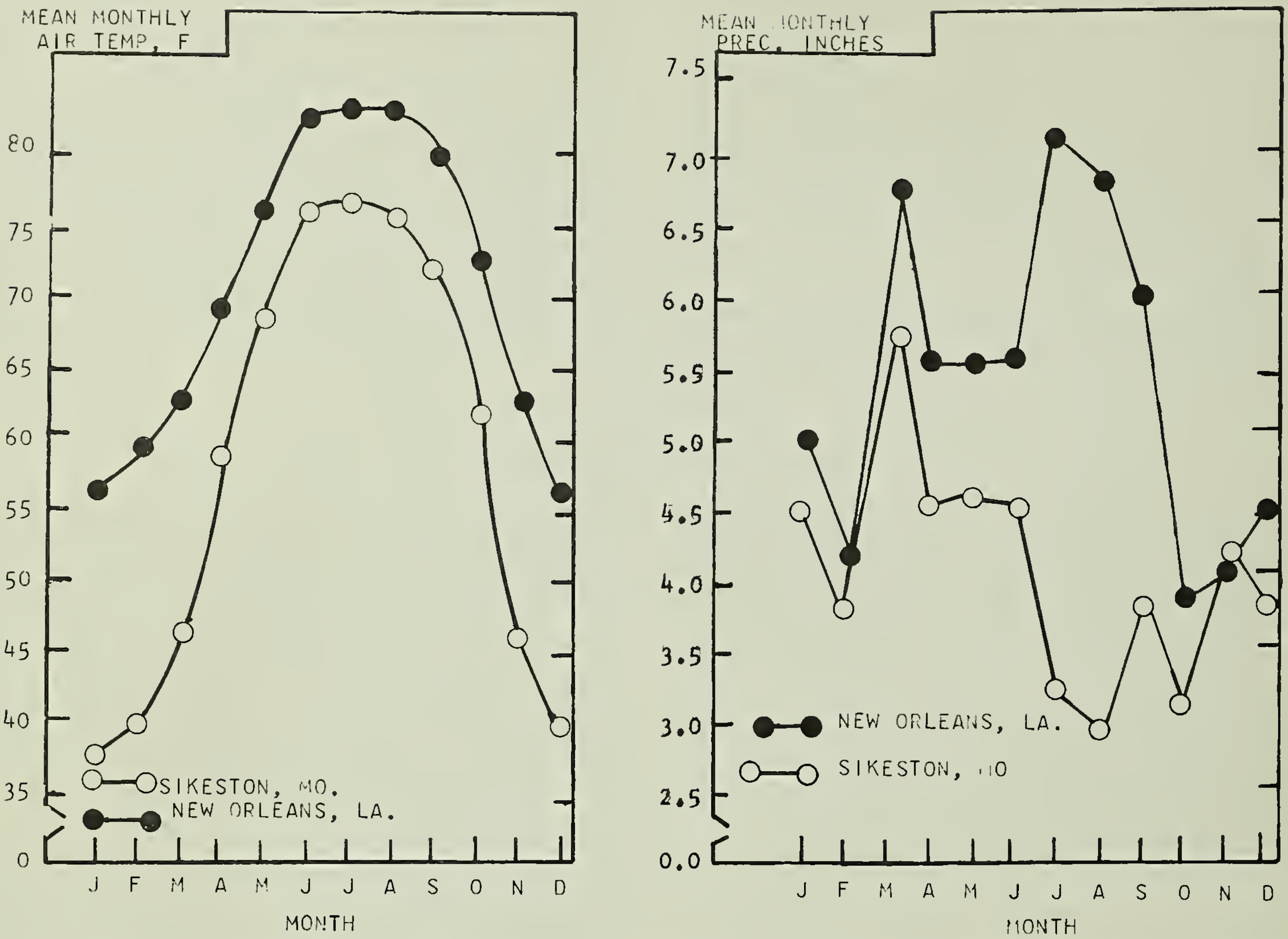

Fig. 3. Mean Monthly Temperature and Precipitation Trends for the Northern and Southern Extremities of the Southern Mississippi River Valley

Table 1. Normal Precipitation, Relative Humidity, and Air Temperature for Selected Sites in the Southern Mississippi River Valley[1]

Site	*Measure*[2]	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*July*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Mean*
Sikeston, Mo.	Precipitation, in.	4.7	3.9	5.9	4.4	4.5	4.2	3.1	2.9	3.8	3.0	4.2	3.7	48.3
1931-1960	Rel. humid., %	—	—	—	—	—	—	—	—	—	—	—	—	—
Elevation: 325 ft.	Temperature, °F	37	39	47	58	68	77	80	79	72	61	47	38	59
Blytheville, Ark.	Precipitation	5.5	4.3	5.0	4.0	4.2	3.3	3.7	3.4	3.2	2.8	3.9	4.2	48.0
1931-1960	Rel. humid., %	—	—	—	—	—	—	—	—	—	—	—	—	—
Elevation: 255 ft.	Temperature, °F	40	43	50	61	70	79	81	80	74	63	50	42	61
Memphis, Tenn.	Precipitation	6.1	4.7	5.1	4.6	4.2	3.7	3.5	3.0	2.8	2.7	4.4	4.9	50.0
1931-1950	Rel. humid., %	64	61	57	54	55	56	57	55	54	50	55	62	57
Elevation: 225 ft.	Temperature, °F	42	44	51	61	70	79	81	81	74	63	50	43	62
Vicksburg, Miss.	Precipitation	5.4	5.1	6.0	4.8	4.2	3.3	4.0	2.7	1.8	2.2	4.6	5.4	50.0
1921-1950	Rel. humid., %	65	63	57	57	59	59	61	59	57	55	55	64	59
Elevation: 230 ft.	Temperature, °F	49	52	58	66	73	80	82	82	77	68	57	51	66
Baton Rouge, La.	Precipitation	5.5	4.4	5.8	4.5	4.9	5.0	5.9	5.9	4.3	3.0	4.7	5.3	59.0
1921-1950	Rel. humid., %	61	58	52	54	54	55	60	59	53	47	52	58	55
Elevation: 60 ft.	Temperature, °F	52	56	60	67	74	80	81	81	78	70	59	54	68
New Orleans, La.	Precipitation	4.8	4.2	6.6	5.5	5.4	5.6	7.1	6.4	5.8	3.7	4.0	4.6	64.0
1921-1950	Rel. humid., %	67	64	60	59	59	60	64	63	62	58	60	66	62
Elevation: 6 ft.	Temperature, °F	56	59	63	70	76	82	83	83	80	73	63	57	70

[1]Data selected from Climatography of the U. S.; Climate of the States; *Louisiana* (60-16) 1921-1950; *Mississippi* (60-22) 1921-1950; *Memphis, Tennessee Annual Summary* — 1931-1960; *Arkansas* (81-3) 1931-1960; *Missouri* (20-23) 1931-1960.
[2]Relative humidity at 12 noon, CST.

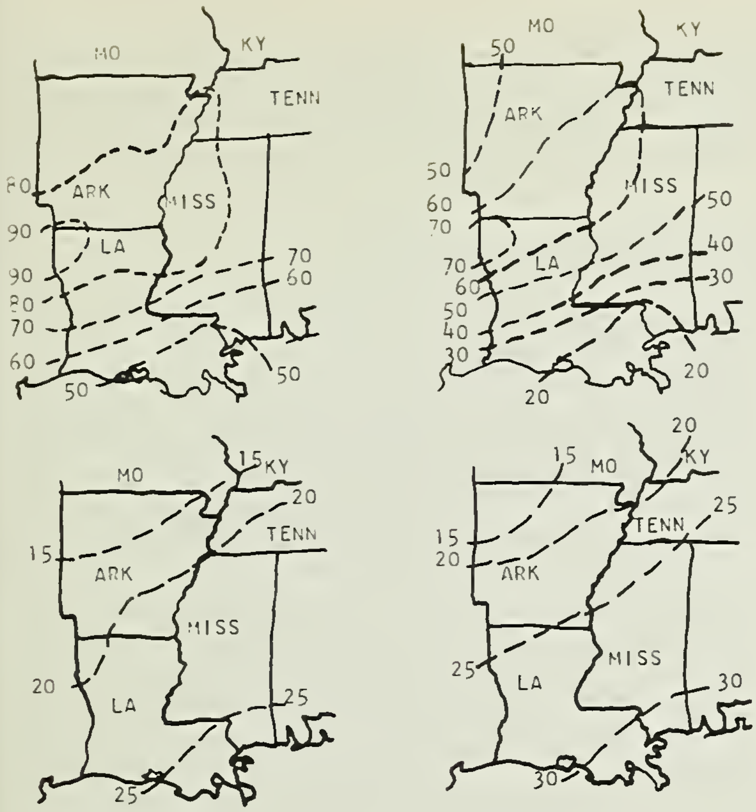

Fig. 4. Minimum Number of Drought Days in Driest Five out of Ten Years, March through November, for Soil Moisture Storage Capacities of 2 Inches (top left) and 4 Inches (top right); and Minimum Inches of Excess Moisture Expected in Five of Ten Years for Soil Moisture Capacities of 2 Inches (lower left) and 4 Inches (lower right) (VanBavel, 16)

In Figure 4A & 4B are shown the number of minimum drought days (based on 5 out of 10 years) for soils with storage capacities of 2 and 4 inches per cubic foot of soil; C and D give the probability (5 out of 10 years) in which surplus water can be expected in soils with storage capacities of 2 and 4 inches. The data for the Lower Mississippi River Valley region show that despite an adequate total annual rainfall, frequent soil-moisture deficits occur through the months of May to October and that, paradoxically, excess moisture is widespread in the region during the winter and early spring months.

Drought occurrence is not only related to the intensity and frequency of precipitation but also markedly dependent on the water storage capacity of the soil. The general expectation is for a lack of available soil moisture to occur in many sections at least 50% of the time, and in a few sections in the southern portion of the region at least 30% of the time. Irrigation has been found indispensible in most sections of the region. Eastern Arkansas, for example, generally has the least amount of rainfall during the months of June, July, August, and September and the greatest rainfall during December, January, February, and March (12). Rainfall in eastern Arkansas varies from 0.53 to 5.88 inches in July. The average number of droughts (14 or more consecutive days with less than 0.25 inch of rain in any one 24-hour period) for five weather locations in Arkansas during the growing season, April to August, averaged 2.6 droughts per season. The number of acres under irrigation in this part of Arkansas increased from 16,000 in 1947 to about one million acres in 1969 (2,17). Similar increases in irrigation have been evident in Mississippi and Louisiana.

Precipitation in the form of snow varies from moderate to light in the north to only rare occurrences in the southern extremity; its duration, even in the northern areas, is limited to only a few days. The mean number of frost-free days increases from 200 in the north to 310 days in the southern portion of the region. Only in 1 out of 20 years (5% probability level) can a severe freeze (below 24°F) be expected after April 3 at Sikeston, Mo.; moderate (28°F) and light (32°F) freezes may occur with this level of probability after April 13 and 25, respectively (6). The probability of freeze occurring after April 3 decreased progressively southward to the New Orleans area where only rarely do the winter temperatures reach 32°F or below (12). Based on average temperature for New Orleans, freezing temperatures can be expected in only 1 out of 7 years. The long-time average number of growing-degree-days (base 50°F) varies from 30 to 940 for January and July, respectively, at Sikeston, Mo., increasing progressively to a continuous growing season in the New Orleans area.

The percentage of total days of possible sunshine decreases from north to south with Memphis receiving about 65% of the total possible sunshine, while the frequency of showers reduces this percentage in New Orleans to about 59% (12,13).

Soil temperatures reflect the annual air temperatures; they have been reported for northern portions of the region (6), the mid-delta region (2,3), and the southern extremity (9). The average monthly soil temperature (uncultivated soil) at Sikeston, Mo., varies from about 40°F in January to about 85°F in July for the 3-inch soil depth; the temperatures at the 24-inch depth vary from 43°F to about 75°F for these respective months (6). The soil temperatures (2-inch depth) in the central portion of the region increase from about 59°F in the first week of April to 72°F in the second week and 76°F by the first of May. There is a 75% probability that the 2-inch soil depth will average at least 68°F for 10 days after the planting dates of May 3 for the northern part of the delta and April 18 for the southern portion, respectively (9). Soil temperatures for a cultivated silt loam soil during the growing season of April to September in the central portion of the delta (Marianna, Ark.) had average maximums of 74° and 80° F at the 4-inch depth for irrigated and non-irrigated soil conditions, respectively, in

1953; minimum soil temperatures were 69° and 72°F for these respective conditions (2,3). The evapotranspiration rates for cotton have been shown to vary with both soil type and soil depth. For example, cotton grown on Dubbs silt loam soil had a maximum rate of 0.23 inch per day, while for cotton grown on Sharkey clay soil the maximum rate was 0.55 inch per day (3).

GEOLOGICAL DEVELOPMENT OF THE VALLEY[1]

One of the earliest and most intensive investigations of the geological development of the Southern Mississippi River Valley was made by Fisk (2,3,4,5). Coleman (1), Russell (6), and Thornbury (7,8) enlarged on the concepts presented by Fisk. Fisk presents evidence that during pre-pleistocene times, the area now occupied by the valley was a dissected portion of the gulf coastal plain. The location of this alluvial valley was controlled by the growth of two great structural downwarps, the east-west trending gulf-coast geosyncline and the north-south trending Mississippi structural trough; and by two major upwarps, the Monroe-Sabine uplift on the west and the southern Mississippi uplift on the east. The local outlines of the valley, the alignment of drainage, and parallelism of tributary valleys closely follow the pattern of minor structural features.

The Mississippi embayment region owes its existence, in part, to the structural trough (3,4). At times the region was erosional; however, the most important factor in its present topography was aggradation. The geologic maps show a broad structural trough between the Appalachian uplift on the east and the Ozark and Ouachita highlands on the west. For a large part of its history, this structural trough was submerged; when it emerged, the Mississippi followed its axis to the sea. The great thickness of the delta deposits and their large extent are due to the large amount of glacial outwash and the high sediment yield of the entire Mississippi watershed including flood plain scoring, channel meandering, and channel erosion from large flood events.

Fisk has presented evidence (3,4,5) that the area was the site for accumulation of a great seaward-thickening sedimentary wedge composed principally of deltaic deposits. The wedge reaches a maximum thickness of at least 20,000 feet near the present coast line. It has accumulated upon a floor of older rocks which are the equivalent of those outcropping in the upland adjacent to the coastal plains and which have been downwarped under the load of the sedimentary wedge.

World-wide glaciation during the pleistocene epoch introduced new conditions. During early glacial times, when the ice sheets first advanced on the continent, many north-flowing streams of the continental interior were integrated around the ice margin to form the Mississippi and Ohio River systems, which were diverted southward into the coastal plains at the north end of the Mississippi embayment.

Climatic changes during this epoch, which is commonly called the "Great Ice Age," permitted periodic world-wide advance and retreat of the ice sheet. Each ice advance was followed by a period of warm climate during which glaciers retreated. In North America, five glacial periods have been recognized: the Nebraskan, the Kansan, the Illinoian, the early Wisconsin, and the late Wisconsin. Cyclic changes in sea level accompanied the glacial and interglacial stages, the level being lowered by the accumulation of glacial ice and raised during interglacial times by the melting of the ice. These changes had a profound effect on the streams outside the glaciated areas. During glacial stages, streams entrenched their courses in accord with lowering sea level; with a rise in sea level during the interglacial stages streams alluviated the valleys entrenched in the preceding glacial stage.

The rise in sea level produced by the melting of the late Wisconsin continental ice caps forced aggradation of the Mississippi Valley. Alluviation took place because this rise in base level decreased the slope of the valley and not because of the increase in amount of sediment brought to the valley. Deposition of materials in the delta indicates that significant changes in climatic conditions occurred since the beginning of the period of alluviation, including glacial and interglacial periods which caused large changes in water discharges of the Mississippi River system. Fluctuations in climate also had a significant influence on erosion rates within the drainage area. For example, the ice cap associated with the Wisconsin age averaged about 10,000 feet thick and extended as far south as St. Louis, Missouri. Its melting, no doubt, caused larger discharges down the Mississippi River system than "normal" rainfall amounts would have during historic times. The tremendous tonnages of chert-gravel deposits transported down the river and deposited at considerable distances east of the channel and as far south as the Gulf of Mexico are indications of significant changes in the discharge rate. Additional evidence of great discharges in the river is to be found in the depth and sequence of the river alluvium, described by Thornbury. He suggests that the alluvium in large river valleys such as the Mississippi was largely due to rising sea levels which accompanied deglaciation, with the associated discharge of immense quantities of glacial outwash down the valleys, with local downwarp-

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ing of the earth's crust also occurring (7,8). There is evidence also of a significant amount of uplift of the embayment area due to isostatic adjustments of the crust to the decrease in weight of the ice cap on the mid-continent area.

The greater part of the recent alluvium is made up of alluvial fan deposits. The widening of a tributary valley at its junction with the master valley, together with the gradual decrease in alluvial valley slope, permitted the tributary stream volume to dissipate, forcing deposition of sediments and thereby causing construction of low deltas around the valley mouth. The deltas determined the nature of sediments that reached the master stream and, together with faults, controlled the position of flood plain drainage.

The present characteristics of the Mississippi River result from the integration of the previous drainage system resulting from a long and complicated series of shifts in the position of both master and tributary streams. Straight courses were maintained during periods of low sea level. Only the master stream below the Ohio-Mississippi River junction meandered in a single channel at that time. Fisk (2) has shown that the Mississippi River first ran its most westerly course near the Ouachita highlands, in what is now occupied by the bottomlands of the Black and White Rivers. The river then changed to a new channel just west of Crowley's ridge, the channel occupied currently by the L'Anguille River. The Ohio River, on the other hand, ran its most westerly course just east of Crowley's ridge in what is now the St. Francis River. The river then moved easterly into the course of the present Mississippi-Ohio river systems. The two rivers joined at Cairo, Illinois, and have since remained relatively stable within the area.

The most recent alluvium arrived during and after the advances of the Wisconsin glaciers, the latest of which moved into the North Central states approximately 11,000 yeare ago. The late Wisconsin glacial stage started approximately 50,000 to 60,000 years ago and reached its maximum accumulation 25-30,000 years ago. The major portions of the sediment from which the delta soils are derived have been deposited less than 11,000 years (2).

The soils of the Southern Mississippi River valley are confined to the southern flood plains of the Mississippi River. The major contributing streams are the Mississippi, Ohio, Missouri, and Arkansas Rivers. The streams carried sediment from an area of 20 states and the soils formed are considered highly variable in nature.

Natural levees were formed near the channel of the main stream and its tributaries. As the stream moved rapidly, sediments remained suspended in the water until after the stream overflowed its banks and slowed down; then the sediments began to settle. Sand and coarse materials were deposited soon after the water left the streambank; therefore, alongside the stream are natural levees made up of coarse-textured sediments. These areas usually have a higher elevation than the surrounding land features. As the water flowed back from the river over the valley floor, it moved more slowly and eventually came to a near-standstill. Back-water deposits were formed in areas where water stood the longest, resulting in deposition of the finer sediments, primarily clay-size particles.

The natural levees and the streambed itself finally reached a height above the backswamps and the surrounding flood plain. When the river reached flood stage it broke from its channel and a new course was cut in the lower parts of the flood plain. This process was repeated frequently and with time the area became interlaced with meandering belts of old abandoned channels of the main stream. Each of these old channels lies between natural levees and grades into poorly drained backswamp areas.

Development of the river alluvium with depth has been described by Thornbury (7). He cites the crosssection of the flood plain materials at Natchez, Mississippi, in which there is a significant depth of relatively clean sands and gravels in the alluvium which contains sporadic clay plugs and finer particle-size deposits of five stream entrenchments into the sands and gravels. This sequence indicates the deposition of gravels, followed by the deposition of sands and gravels of somewhat smaller particle size, followed by an overlying sequence of natural levees, point bar deposits, clay plugs, and backswamp deposits. The pattern of stream meandering throughout much of the Mississippi River flood plain reflects the ease with which the river has been able to shift the position of the bottom of the channel within these sands and gravels. Clay plugs (formed by the filling of oxbows with backswamp deposits) are more limiting to the pattern of stream meandering south of Natchez than upstream from Natchez.

Presently, the valley extends from Cairo, Illinois, to the Gulf of Mexico, meandering over a distance of about 900 miles. It varies in width from about 125 miles at Helena, Arkansas, to 25 miles at Natchez, Mississippi. It drops in elevation from about 350 feet above sea level at Cairo to 25 feet at Natchez, with considerable variation in gradient. The river is considered by Thornbury (7) and Fisk (3) to have attained a profile equilibrium and is therefore described as a graded stream.

GENESIS OF THE SOILS OF THE VALLEY[1]

Factors of Soil Formation

Soil is a function of climate, living organisms, parent materials, topography, and time (42). The nature of the soil at any point on the landscape depends on the combination of these five major factors at that point. All five factors come into play in the genesis of every soil, with the relative importance of each differing from place to place. In extreme cases one factor may dominate the formation of the soil and fix most of its properties, as is common when the parent material consists of almost pure sand. Little can happen to sand-sized quartz, and the soils derived from it have faint horizons. The Crevasse soils have formed in almost pure quartz sand and, except for slight darkening of the A horizon by organic material, they have not been changed by the factors of soil formation. Crevasse soils are on very young surfaces along the present river channels and on the oldest natural levees along former river channels and oxbows. Their parent material has almost completely controlled their formation and characteristics; age, topography, climate, and living organisms have done little to alter the nature of the parent material. For every soil the past combination of the five factors and their interaction have determined its present character.

Climate

The climate of the Southern Mississippi Valley is of the humid, warm-temperature, continental type (4). Average annual precipitation is 48 to 64 inches, increasing from north to south. Over most of the area precipitation is highest in winter and early spring, decreasing to a minimum in the autumn; along the Gulf Coast it is highest in midsummer and early autumn. Average annual temperature is 59° to 70°F., increasing from north to south. Average freeze-free period is 200 to 310 days, increasing from north to south.

The air climate has perhaps been responsible for some differences in the soils and has influenced some genetic characteristics. For example, the cooler, dryer climate along the northern part of the area is probably in part responsible for formation of the dark A horizons on soils such as Portageville, Reelfoot, and Tiptonville. The organic matter is not oxidized as rapidly under cooler temperatures and lower precipitation, and a higher equilibrium level is maintained between organic matter gains and losses. In the southern part of the Valley, the air climate has also influenced the formation of soils with dark A horizons such as those of the Iberia, Moreland, and Barbary series. There the long growing season and high rainfall have caused heavy vegetative growth of the forests and grasslands. The organic matter gains and losses in these soils have a high equilibrium level.

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The internal environment of the soil has been responsible for the present character of many of the soils. Environmental differences are largely due to presence or absence of water tables and the depth and duration of the water table. Soils that do not have a water table within the solum have colors in chroma of three or more; these well drained soils include the Bosket and Dubbs soils. Soils such as Mhoon and Waverly, with seasonal high water tables, have gray colors with yellowish or reddish mottles. Soluble products of plant decomposition in the presence of free water cause reduction and solution of iron oxides in the soil. Since the water is not percolating through the soil, all of the reduced iron is not removed but some is reoxidized into mottles when the soil dries. The characteristic color of these soils is virtually iron-free gray areas and red, yellow, or brown streaks or spots with oxidized iron and manganese (6,9,31,77). Soils that have formed under seasonal high water tables include those of the Guyton, Amagon, Dundee, Forestdale, and Tensas series.

Other soils are developed under a continuous or almost continuous water table or a ponded, swamp, or marsh condition. These soils have a thick mat of partially decomposed or undecomposed organic matter over grayish, greenish, or bluish mineral soil that lacks mottles. The products of organic decomposition in the presence of free water have caused reduction of the iron oxides. Since the soil does not dry and become aerated, the iron is not reoxidized to form mottles. Some deposited sediments are gray and have not been changed since deposition. Soils formed under a continuous high water table are those of the Barbary series.

Living Organisms

Plant and animal life in and on the soil have helped to change the parent materials and have influenced the present character of the soil (15,16, 68,72). Plants add organic matter and nitrogen to the soil. Some plants can take nitrogen from the atmosphere and, through decay of the plant residues, add it to the soil. Soil pH can be influenced by the nature of plant residues. Products of plant decomposition are an active force in the oxidation-reduction reactions, which alter the iron and manganese minerals in the soil parent material. Bulk density of the soil has been shown to be changed rapidly by developing vegetation. The darkening and development of an A horizon due to organic matter is one of the earliest indications of horizon development in very young sediments.

Plant communities in the Southern Mississippi Valley are varied, depending on the drainage of the soil materials and on their texture. On the low, better drained, loamy textured ridges the trees are chiefly hickory, cottonwood, pecan,

white oak, red oak, blackgum, and winged elm. Soils on these ridges include the Bosket, Dubbs, and Beulah series.

On the low and wet but not swampy areas, the principal trees are water tupelo, sweetgum, soft elm, green ash, hackberry, overcup oak, and willow oak. On the loamy wet areas, cottonwood is also important. Dundee and Amagon soils developed on the loamy wet areas. Sharkey, Alligator, Forestdale, Tunica, and Perry are some of the soils that formed on wet clayey areas.

Canebrakes covered many of the border flats along the swamps, sloughs, and bayous where the Bowdre soils formed. Some areas had a native vegetation of grasses of the Andropogon and Panicum species and sedges. On these areas, soils such as the Iberia and Jeanerette have developed. The mollic epipedons in these soils are largely due to the grass or cane vegetation under which they developed.

Swamp areas have forests of bald cypress, water tupelo, sour gum, water ash, and swamp maple (38). After subsidence of the swamp by lowering of the water table, soils such as Sharkey developed in these areas. Fresh water marshes had vegetation of fresh 3-corner grass, cattail, seacane, roseau cane, dogtooth grass, and alligator grass. Brackish marsh had wiregrass, salt grass, black rush, salt marsh, 2-corner grass, and pond weed (62). In these marshes, the residues of the plants fell back into the water. Under the water, these organic materials remain in an undecomposed condition or are partly decomposed by anaerobic processes. Where the water level remains constant, a thin organic layer is deposited. Soils with thin organic horizon such as Barbary are developed. When the water level rises as the peat bed is laid down (28), these plants continue to grow and return plant residues into the marsh. Soils such as those of the Maurepas series are developed in these marshes.

Animals in the soil convert raw plant residue into humus and mix the humus with the mineral portion of the soil. They carry the humus deep into the soil as they retreat downward with the moisture during dry weather. Their tunneling operations have the effect of moving mineral material from one horizon of the soil to another. The tunneling also helps to break down and destroy the original structure of the sediments. Tunnels left by animals facilitate the movement of water through the soil. It has been reported also that earthworms definitely increase both the size and stability of soil aggregates (20,37).

Animal life that is most noticeable in the soil of the area includes burrowing rodents and earthworms and such larger insects as beetles and grubworms. The Crustacea such as crayfish are common in many poorly drained soils. These animals mix the soil and tunnel through it. Microscopic animals make up a large population of the soil microflora. They aid in decomposition of plant residue and its conversion to humus. Bacteria also aid in conversion of atmospheric nitrogen to soil nitrogen.

With the development of agriculture and clearing of the native vegetation, man is influencing the formation of soils (42). By draining swamps, improving drainage, leveling soils, controlling floods, irrigating, introducing new crops, cultivating crops, and adding fertilizer, lime, and other chemicals, man is changing the direction of soil formation. The results of these activities on most mineral soils probably will not be evident for many centuries. But man can change the character of Histosols and Hydraquents in a relatively short time.

Parent Materials

The character of the parent material controls the texture and mineralogy of most of the soils that are formed from it. Soil drainage and soil color are also influenced by the kind of parent material. Where the deposited sediments are of loamy textures, soils developed from these sediments will also be of loamy textures. Clayey sediments high in montmorillonite develop into clayey soils with montmorillonitic mineralogy. Some changes in the texture of the raw sediments do occur during soil development, but the texture of the developed soil still is controlled by that of the parent material. In parent materials of stratified contrasting texture, the processes of soil development mix the contrasting strata so that the developed soil will have more uniform texture than the parent material, providing the strata are not thick. The texture of the developed soil will still remain within the limits of the textures of the strata; individual soil particle size is little changed after its deposition in this alluvial valley.

Some of the color characteristics of the soils are believed to be inherited from the parent materials. The red color of soils developed in sediments deposited by the Arkansas and Red Rivers are considered relict colors from Permian Red Bed materials carried by the waters in these river basins. These materials seem to resist color change. Soils formed in these sediments have reddish colors even though they have developed in a climate of alternate periods of saturation to the surface and of dry weather when the water table withdrew to depths below the soil. These reddish soils include those of the Portland, Desha, and Buxin series.

The parent materials in the Southern Mississippi Valley are almost all fluvial sediments, deposited during periods of river floods. The kinds of sediments greatly influenced the kinds of soils developed.

Crevasse soils are along the channel slopes of both old and young natural levees. These soils are in areas where flood waters first leave the channel and are developed in the coarser sediments. Across the tops of old levees are loamy soils such as Beulah, Bosket, and Dubbs, which in

the order listed become less sandy and more silty. The older back swamps have clayey soils such as Alligator and Forestdale. Areas between the older natural levees and older back swamps have silty soils such as those of the Dubbs, Dundee, and Amagon series.

In areas of younger deposition where natural levees are still being built up, soils such as Robinsonville and Morganfield are along the tops of the levee. Sharkey and Tunica soils are in back swamps of young and intermediate age, and soils such as those of the Adler, Morganfield, Commerce, Bruin, and Mhoon series are in areas between the levee and back swamp.

On areas where clay has been deposited over the loamy older natural levees, soils such as Tunica, Bowdre, and Newellton have developed.

The patterns of soils and soil development have been greatly influenced by the kinds of parent material deposited. The sequence of sandy soils along the channels, loamy soils on top and on the back side of levees, and clayey soils in the back swamps is common through much of the Southern Mississippi Valley.

Soils on the older terraces in the Southern Mississippi Valley have developed in loess or alluvial materials. For the most part, these materials were high in silt and in weatherable feldspar minerals. Silty soils such as Foley and Guyton developed in these terraces. These soils have moderate to high sodium content within some part of the argillic horizon.

Topography

Topography within the Southern Mississippi Valley is closely related to the forces and patterns of the deposition of the parent materials. Local differences in topography are largely due to the low ridges of the natural levees and the depressional areas of back swamps. Subsequent dissection of natural levees and back swamps by migrating river channels and by abandonment of old channels and rechannelling have added complexity to the original simple depositional patterns. Local differences in elevation are slight, ranging from about 6 meters per mile to less than 30 cm per mile. Flow of flood waters has further complicated the topographic pattern in that they scour and remove materials within small areas and deposit them in adjoining small areas, leaving an undulating condition of low ridges and shallow depressions. Differences in elevation in these undulating areas range from only a few meters to centimeters.

The influence of topography on soil genesis has been largely that of soil drainage and of water table height and duration. Water drains off the natural levees readily. Also, the natural levees are on elevations that are above the static ground water table except during floods. The soils on the levees are well aerated most of the time. The sediments are exposed to oxidizing conditions for long periods (14). Soils on the levees have colors of high chroma and are well drained. These soils include Beulah, Bosket, and Dubbs. In local depressions of the natural levees and in seepage areas along the backs of the levee, water collects and ponds or saturates the soils for intermittent periods, long enough for the formation of soils with gray colors. Soils in these areas include those of the Dundee and Amagon series.

In the depressional back swamps, runoff of water has been very slow. These areas also receive runoff water from the sides of the natural levees. During wet periods when the river channel is filled but the river is not at flood stage, the ground water table is at or near the soil surface. During dry seasons the water table recedes below the solum. Soils in the back swamp have developed under alternate wetting and drying. With the presence of organic matter the sediments were exposed to reducing conditions and the soils which developed have gray colors with mottles of brown through red. Soils such as those of the Sharkey, Alligator, Tunica, and Perry series developed in these back swamp areas.

Topography in the Southern Mississippi Valley, through its effect on runoff and water table, has influenced the development of soils and helped to control the character of the soil in any particular place in the Valley.

Age

The length of time parent sediments have been in place influences the present character of the soils. Time is required for the varying soil-forming processes to express themselves as soil characteristics. Hardy (39) reported that the surface 30 cm of volcanic soils in place 14 years after the last eruption contained 1.0 to 2.0 percent organic matter. A relatively short time is needed for A horizons to develop under vegetation native to the Southern Mississippi Valley. A much longer time at the same intensity of development is required for the development of illuvial horizons. Aaltonen (1) reporting on the formation of the illuvial horizon in sandy soils of Finland presented data that indicated formation of an argillic horizon in these materials would require about 500 years. Mattson ond Lonnemark (55) supported this viewpoint. Different lengths of time are required for the leaching of carbonates and bases and the reduction and transfer of iron.

Length of time during which alluvial sediments have been in place varies from about 11,000 years (65) to the present. Deposition of fresh sediments continues now on areas that are not protected from flooding; they receive additional materials during each flood.

The Southern Mississippi Valley sediments are geologically young. Time has not yet permitted strong weathering of the high amounts of weatherable minerals in the sediments.

Even in this geologically young valley, differences in age apparently have influenced soil formation. The Beulah soils and the Robinsonville

soils have similar textures and mineralogy. The Beulah soils are on older natural levees; the Robinsonville soils are on younger natural levees. Robinsonville soils have darkened A horizons but lack diagnostic subsurface horizons. They have many thin stratifications (bedding planes). Reaction is slightly acid to moderately alkaline. Little has happened to change these materials since deposition except for the addition of organic matter to form an A horizon. Beulah soils have cambic B horizons with colors of higher chroma than the A or the C horizon. The yellowish brown B horizon has subangular blocky structure. The reaction is strongly acid through medium acid. Time has apparently been sufficient for the leaching of bases in the Beulah soils, destruction of the thin stratifications of deposition, development of stable peds, and oxidation of iron minerals. Since these two soils are in similar patterns on the levees and have similar textures and mineralogy, their present differences have been influenced by how long their parent materials have been weathering; or, if they are of the same age, then the intensity of soil formation has been greater in the Beulah than the Robinsonville soils.

Differences attributable to time between the Dubbs and Morganfield soils are even more striking. Dubbs soils have the high chroma colors indicative of well drained conditions, low pH indicative of leaching, and also evident clay film of peds in the B horizon developed by translocation of silicate clay minerals in the profile. Morganfield soils have little evidence of development other than an organic stained and darkened A horizon. Dubbs soils are on older natural levees; Morganfield soils are in the younger sediments.

The clayey soils of the back water swamps also have differences that can be attributed to the influence of time. Alligator soils usually are in the older back swamps along abandoned river channels. Sharkey soils are in younger back swamps along more recently abandoned channels and present channels. Both soils have cambic horizons developed under alternate periods of saturation and drying which favor reduction and oxidation of iron in the sediments. Under a reducing environment, the sediments have changed during soil formation. The Sharkey soils are usually slightly acid through moderately alkaline in the cambic horizon and the C horizon; Alligator soils are strongly acid or very strongly acid in the cambic horizon and slightly acid or neutral in the C horizon. Apparently the leaching of bases has progressed much further in Alligator soils than in Sharkey soils, and this leaching probably has required a long period of time. These soils are slowly permeable and the leaching process is a slow one. Further, they have seasonal high water tables and during these seasons, water does not percolate through the soil. Some Alligator soils may have been derived from acid sediments.

Some terrace soils from silty uplands are much older than those soils in the Mississippi River alluvium. It is believed that some of these terrace deposits are over 20,000 years old. Soils such as those of the Guyton and Foley series have developed on these older landscapes. These soils have strongly leached albic horizons which tongue into the upper part of the argillic horizon. Peds in the upper part of the B horizon have uncoated silt grains along their surface. Calcium-magnesium ratios are less than 1 and the B horizon in some parts has high sodium saturation. Horizons with sodium saturation of more than 15 percent are within about 75 cm of the surface in the Foley soils; depth to horizons of high sodium saturation is more than 1 meter in the Guyton soils.

Time is necessary for the processes of soil formation to act upon the parent materials of soils. Time is required for the accumulation of organic matter and for its incorporation into the soil, for leaching of carbonates and salts, for translocation of silicate clay minerals, and for reduction and transfer of iron. The length of time the sediments have been in place has significantly influenced development of soils in the Southern Mississippi Valley.

Genesis of Argillic Horizons

An argillic horizon is an illuvial horizon in which layer-lattice silicate clays have accumulated by illuviation to a significant extent. It therefore must be formed below the surface of the mineral soil, though it may later be exposed at the surface by erosion (75).

Where clay moves from one horizon to another, or from one point to another within a horizon, something must start the movement and something must stop it. Soil scientists are not in general agreement on the forces that are responsible.

Thorp, et al. (74) showed that clay was moved in suspension by water. These investigators concluded that where the soil contains clays that shrink and swell with moisture changes, the wetted surface of a dry ped will swell quickly and may exfoliate. In the process, some of the fine clay goes into suspension and moves with the water.

According to Lutz and Chandler (52), acid weathering of the soil minerals causes a marked loss of metallic cations, including iron and aluminum, but most of the silica remains behind. Organic and inorganic colloids are dispersed and moved downward in the percolating waters. This theory seems to indicate that the movement is one of constituents of the clay, rather than of individual clay particles, though this was not expressly stated.

Other investigators (12) hypothesized that as organic matter decomposes and dissolves in the presence of iron-bearing minerals, solution of iron in the ferrous state is promoted. Water carries the ferrous iron in solution and dispersion and

also carries organic materials. As the water percolates through the profile it encounters soil layers less acid than the surface and oxidation takes place more readily, rendering the iron less soluble. Material so precipitated under the slightly changed conditions serves as a filter mat to remove still more material from the percolating waters. This theory requires the breakdown of the clay minerals prior to movement from one horizon to another, rather than movement of the individual clay particles.

In theorizing on the mechanics of silicate clay movement in soils, Mattson and Gustafsson (53, 54) stated that movement stoppage is due to the isoelectric point; Byers, et al. (12) credit it to oxidation of minerals to less soluble form.

Thorp, et al. (72) concluded that clay accumulation in B horizons of Miami silt loam and similar soils is due primarily to movement in suspension from upper to lower horizons where much of the clay is deposited by drying or as a result of differences in chemical environment. Most frequently, except in winter and spring, plants use up all the "free" water before it goes out of reach of the roots. Any suspended clay is left behind to be added to that already there.

Morphology of the Miami silt loam shows that the original blocks of the upper part of the B horizon have lost most of the clay coats they may have had and now are dull in color and sprinkled with whitish silt (73). Lower in the B horizon, the lower parts of the blocks are covered with shiny clay, and finally in the B22 the brown clay skins cover all surfaces, line root holes, and fill most other cavities. Examination of the clay film with the petrographic microscope shows clearly that the clay crystals of this film are oriented with the C-axis perpendicular to the surfaces which they cover. Clay minerals in water suspension can be laid down as an oriented film either by evaporation of the liquid or by a filtering action as turbid water is sucked into dry ped interiors from cracks, pores, and channels as the dry soil is wetted.

Evidence from leaching columns (74) substantiates evidence from soil morphology and micromorphology that clay is being removed gradually from the A3 and B1 horizons, is carried down in suspension, and is largely deposited in the B2 horizon, probably with some loss of clay from the solum. Thus the upper B horizon is gradually converted into an A2 horizon as much of the clay is removed and coarser fractions remain behind.

The genesis and characteristics of clay film on peds in the B horizon have been reported by a number of investigators (10,11,36,48,49). Buol and Hole (11) concluded that clay film soils of Wisconsin are formed by the percolation of dilute clay suspension, with clay deposited and accumulated as percolation ceases and the larger pores are emptied of water. They showed (10) that the clay film thickness over the ped surface is quite variable. The skin smooths the ped surface by thinning over projections and thickening in depressions. They reported that clay film in the B2 horizon was of greater thickness and consisted of more layers than film in the B3 horizon. These investigators made the following observations, based on field investigations, studies of thin sections of undisturbed samples, and laboratory experiments with leaching columns: 1. Clay skins form chiefly in soils with relatively stable aggregates and root channels; mainly in soils of finer textures than sands, loamy sands, and coarse sandy loams. Where clay accumulates in B horizons of the coarse textures, the skins coat individual coarse mineral particles rather than ped surfaces. 2. Clay skins form chiefly in soils that contain an adequate supply of clay. Coarse-textured soils simply do not supply enough clay in the A horizon to produce appreciable quantities of clay skins. 3. In the genesis of clay skins, time allows for their construction, disruption, and removal. 4. Percolating water moves the clay skin material in suspension and deposits it wherever the percolation is arrested. 5. Natural clay skins are formed in very small increments of minute lamellae. Thick clay skins are formed by successive additions of thin layers. 6. Soil expansion and contraction and soil turbation or mixing by freezing and thawing, by desiccation and wetting, by slow mass movement, and by activities of organisms cause fragmentation of the clay skins in the upper horizons and incorporation of the fragments into the interiors of the peds.

Studies by Retzer and Simonson (64), Grossman, et al. (36), and Khalifa and Buol (48) showed that the ped surfaces or clay skins had more clay than the centers of the peds. Fine clay also was greater on the ped surface than in the interior. Grossman, et al. (36) also reported that in soils with significant percentages of both montmorillonite and non-expanding 2:1 lattice clays, ped surfaces where clay is accumulating have more montmorillonite than the bulked peds, whereas ped surfaces in the upper B that is being degraded have less montmorillonite. This would appear to support the observation by Thorp, et al. (74) that exfoliation of the peds through shrink and swell of the clays on wetting and drying supplies much of the clay that is suspended in and moved through the soil by the percolating water.

There is disagreement on the mechanics of silicate clay transfer in the soil profile. Investigators in general agree that water percolating through the profile is the carrier vehicle. Also, they agree that organic matter is necessary for clay to be moved, but do not agree on its actual role. They also generally agree that alternate wetting and drying is essential for the movement and for accumulation in the B horizon. Soils in the Southern Mississippi Valley, except for those in swamps of permanent saturation, have these necessary characteristics.

Presence of translocated clay in the B horizon is a criterion for identifying the argillic horizon. Clay must be present in the soil material before clay films can be formed. For this reason the almost pure sands from which Crevasse soils formed can never be expected to furnish the necessary clay to form an argillic B horizon. Beulah soils contain only small amounts of clay, and in time may have weak argillic horizons. At best individual sand grains may eventually be coated, with little or no clay film on the peds; the A horizon does not contain enough clay to produce appreciable clay film.

Most of the clayey soils in the valley undergo expansion and contraction on wetting and drying, so that any clay films that form are probably fragmented and incorporated into the soil mass. Clay film is not evident in these soils. Where an argillic horizon is present in these soils, it can be identified mainly by the difference in clay content between the A and B horizons.

Soils on the natural levees such as Bosket, Dubbs, and Dundee have argillic horizons with evident clay film. Clay that could be moved is still present in the A1 horison, and these soils lack an evident A2 horizon. It would appear that they will eventually have much more distinct argillic horizons if conditions continue to favor silicate clay translocation.

Guyton soils on older terraces have well expressed profile development. They have strongly leached A2 horizons, and upper B horizons with grey silts on the peds like the Miami silt loam described by Thorp (73) or the degradational ped surfaces of Grossman, et al. (36). The lower B horizon has thick clay films on the peds, and calcium-magnesium ratios of about 0.4 to 0.8. Extractable sodium in the lower B and upper C horizons is about 12 to 35 percent of the cation exchange capacity by sum of cations.[2] It is assumed that clay is now being removed from the upper part of the B horizon and is being translocated into the lower part in these soils.

Other soils such as those of the Zachary series have thick albic horizons with clear or abrupt boundaries to the argillic horizon. The upper part of the argillic horizon has more than twice as much clay as the albic horizon and there is no evidence of degradation. These soils are on fairly young surfaces of stream alluvium draining the silty uplands and silty terraces. It is believed that transfer of silicate clays from the A to the B horizon is proceeding at about the same rate as the deposition of new clayey materials. The calcium-magnesium ratio in the argillic horizon is more than 2 and sodium saturation is about 7 percent.[3]

2. Unpublished data from samples collected in Ouachita Parish, Louisiana; data in the Soil Survey Laboratory, Lincoln, Nebraska.

3. Unpublished data of the Arkansas Soil Testing and Research Laboratory on samples from Woodruff County, Arkansas.

Genesis of Cambic Horizons

The cambic horizon is an altered horizon having textures finer than loamy fine sand (75). The altered horizon is produced by action of frost, roots, or animals; the original rock structure is destroyed. Cambic horizons are formed by hydrolysis of some of the primary particles to form clays and liberate sesquioxides; solution and redistribution or removal of some carbonates; or oxidation, reduction, and segregation or removal of free oxides.

Where water stands at or near the surface for long periods and with alternating dry and wet conditions, iron compounds are reduced to soluble compounds (76). This alteration of iron is reflected by gray matrix colors and yellow and brown mottles. After the iron has been reduced it may be completely removed from the soil or moved short distances and concentrated. Iron has been segregated into brownish concretions in horizons of many soils.

Gile (31) measured ground water levels in soils classified as Low Humic-Gley and Humic-Gley in New Hampshire. The water table remains in the upper solum during late fall, winter, and early spring. Water-soluble products of plant decomposition, moving downward from the surface, aid in the movement of iron compounds (6). Iron oxide is depleted in the upper solum and accumulated in lower horizons.

McKeague (58,59,60) reported on the rate and extent of development of dull colors and mottling in permanently or periodically flooded soil material. He suggested that presence or absence of readily reducible iron oxide was a major determining factor. High amounts of iron moving in solution in reduced soils high in organic matter are consistent with the observed maximum bleaching of gleyed soils just below the horizon of organic matter accumulation. The iron is removed from the horizon, and the bleached gray colors are characteristic of the iron-poor materials remaining.

Cambic horizons formed by hydrolysis of some of the primary particles to form clays and liberate sesquioxides occur in soils that are not seasonally saturated. Baur and Lyford (5) reported on soils with weak B horizons in the Northeastern United States. These soils have thin dark A1 horizons over paler A2 or A2-like horizons which are poorly differentiated from the underlying B2 horizon. The B2 horizons are relatively uniform in color, have weak subangular blocky structure, and do not show evidence of significant silicate clay accumulation. Flach (30) attributed the color of the B horizon to hydrated iron oxide coatings on clay particles. The weak, subangular, blocky structure was related to preferred orientation of the clay particles. He postulated soil-forming processes for Sols Bruns Acides were similar to those

for Red-Yellow Podzolic soils, but differences were attributed to age.

Beulah soils occur on natural levees. These soils are acid, have uniformly low clay percentages throughout the solum, and have B horizons with weak subangular blocky structure and higher chroma colors than the A horizon. These soils are not seasonally saturated. Water movement through the soil and leaching of bases contributed to the soil genesis. Silicate clay has not accumulated as visible clay film on ped surfaces, but the soil particles in the B horizon appear to have oxide coatings.

Gile (32) and Gile, et al. (34) studied cambic horizons formed in desert soils of New Mexico. These soils have one or more of the following characteristics: redder hues than adjacent horizons, development of at least a weak grade of structure, evidence of some silicate clay accumulation but not sufficient for an argillic horizon, and redistribution of carbonates. Morphogenetic sequences of carbonate accumulations are described and related to genesis of the B horizon. These cambic horizons with minimal changes formed in soils less than 5,000 years old. Cambic horizons in older Pleistocene Age soils have evidence of much more change. In some soils former argillic horizons could have been destroyed by soil mixing by rodents, termites, and insect burrows. In addition, a former argillic horizon can be engulfed and masked by subsequent long-continued carbonate accumulations.

Increasing age of a soil is correlated with development of an A horizon, destruction of thin strata, slight accumulation of carbonates, development of structure in materials of sufficiently fine texture, and continued carbonate accumulation development of a weak calcic horizon (33).

The Moreland series represents soils that have lost carbonates in the upper solum and have developed structure. Moreland soils formed in reddish clayey sediments of the Arkansas and Red Rivers and their tributaries. These soils have A and upper B horizons that meet the requirements for mollic epipedons. Reaction of the A horizon ranges from slightly acid through mildly alkaline. The B horizon has weak and moderate subangular blocky structure and a few black soft concretions, which are probably accumulations of iron, manganese, and organic matter. The upper B horizon is neutral to moderately alkaline and the matrix is noncalcareous. The lower B horizon is calcareous and has accumulations of $CaCO_3$ as soft reddish brown bodies with fine hard centers. Development of B horizons with structure and accumulations of $CaCO_3$ typifies the diagnostic cambic horizon of these soils.

Genesis of Soils in Vertic Subgroups

Soils classified in vertic subgroups have horizons with clayey texture and high shrink-swell potential, and crack during the dry seasons. These soils lack the gilgai relief, intersecting slickensides or parallelepiped structural aggregates that are characteristic of the Vertisol order.

DeMent and Bartelli (21) reviewed the relation of the cracking properties of soils to their mineralogy and clay content. Soils most common in vertic subgroups are those dominated by, or with a significant portion of, montmorillonite, and with more than 40 percent clay.

Soil series in the Southern Mississippi Valley Alluvium that have vertic properties are Alligator, Baldwin, Buxin, Desha, Earle, Iberia, Moreland, Perry, Portageville, Portland, Sharkey, Tensas, and Tunica. These soils have ochric or mollic epipedons and most have cambic horizons, but the Baldwin and Tensas series have argillic horizons. Each series has the common properties required by vertic subgroups.

Most of these soils are saturated with water at some period in the year. The significant feature of these soils is alternate wetting and drying. The drying periods permit the soil to shrink and crack.

Shrink-swell properties of soils can be expressed as a coefficient of linear extensibility (COLE), which is determined as follows (35):

$$\mathrm{COLE} = \left\{\frac{\mathrm{Dbd}}{\mathrm{Dbm}}\right\}^{1/3} - 1$$

where Dbd is the bulk density of oven-dry soil and Dbm is the bulk density at 1/3-bar water content. Potential linear extensibility is the product of COLE times the thickness of the layer involved. Soils in vertic subgroups of humid regions have a COLE of .09 or more in horizons at least 50 cm thick and a linear extensibility of 6 cm or more in the upper 1 meter.

Genesis of the Sharkey series has been influenced mainly by the parent materials and topography. These soils have clayey A horizons that have accumulations of organic matter. The B horizons contain 60 to 85 percent clay and have weak and moderately subangular blocky structure. The clay mineralogy is montmorillonitic.

The Sharkey and Alligator soils occur on broad back swamp areas where fine-textured sediments were deposited. These sediments are estimated to be 3,000 years old in the southern portion of Louisiana and as much as 11,000 years in Arkansas and Mississippi.

The soils are saturated for long periods during winter and spring but dry during periods of low rainfall. During periods of saturation the montmorillonitic clays expand and swell, and they shrink when dry. The shrinkage is not sufficient to destroy the soil structure or to produce coarse intersecting slickensides. These soils do not churn. Layers of sediment with different colors persist. It is believed these soils are not completely dry nor do they dry out frequently enough to develop the churning effect of the vertisols. A few slickensides formed, which is further evidence

of high shrink-swell properties. Simonson (67) reported that Sharkey soils in Tunica County, Mississippi, have cracks 2.5 to 10 cm wide at the surface which extend downward for 60 to 90 cm. He stated that these soils seem to shrink and swell less than do Grumusols.

The effect of continual saturation on development of vertic characteristics is illustrated by the Barbary series. These soils have clay contents and mineralogy similar to the Sharkey series, but they do not get dry enough to shrink and crack.

The Tensas soils have argillic horizons and vertic characteristics. They have clayey A horizons and upper B horizons to depths of 18 to 36 inches. The lower B horizon is loamy. The peds in the B horizon have coatings of clay film. Mineralogy of the clay fraction is dominated by montmorillonite. Soil reaction is medium through very strongly acid, and bases have been lost by leaching.

Tensas soils occur on low terraces. Slopes range from 0 to 5 percent. Although the soils are saturated during the wet seasons, they are not saturated for long periods, as evidenced by the colors of grayish brown and dark grayish brown in the upper sola.

When dry, Tensas soils have cracks that extend to depths of 50 to 90 cm. The COLE is .09 or more for the clayey upper solum. Shrinking and swelling have not destroyed the argillic horizon.

Clayev montmorillonitic parent materials are dominant factors in the genesis of soils classified in vertic subgroups. These soils are saturated with water for some part of the year but are dry long enough to shrink and crack. They are not dry to depths of 1 meter for long enough periods to develop properties of the vertisols. They lack evident gilgai microrelief.

Genesis of Histosols and Hydraquents

Histosols were formed by filling in of swamps and wet areas with the remains of vegetative growth (28,41). The vegetative growth is that of water-loving plants. Leaves, twigs, and other plant parts fall into the water; this prevents their complete decomposition by keeping out the oxygen necessary for the decaying process.

Organic peats and mucks accumulate in a narrow range of water depths. A pond or swamp condition is necessary, as vegetative matter will be decomposed unless it is covered by water most of the time. The water must be shallow or plants will not grow or thrive; relatively few plants are able to thrive in water more than 1.8 meters deep. Most peat and muck-forming plants thrive in water depths of less than 1.8 meters.

Hydraquents are clayey soils of the tidal marshes that are permanently saturated with water. These soils have never been dry and water contents are very high. Soil strength is very low.

Radiocarbon dates (56,57) indicate that the peat in the coastal marshes of Louisiana began to develop approximately 3,000 years ago. In areas relatively undisturbed by levee sedimentation, the rate of accumulation averages 10 centimeters each 100 years.

Fisk (28) discussed the development of peat through evolution from mud flats to slightly brackish marshes and then through brackish and saline marshes. He showed the distribution and thickness of peat in the vicinity of New Orleans; thickness ranged from 0 to about 6 meters.

The kind of marsh or swamp affects the vegetative materials deposited in peat beds. Different species of plants grow and thrive, depending on kind of soil material, depth, and quality of water. O'Neal (61), Penfound and Hathaway (62), and Hall and Penfound (38) reported on species that grow in different Detaic plain environments.

According to Coleman (14), most of the Histosols and Hydraquents in the Southern Mississippi Valley were developed in swamp, fresh marsh, or brackish marsh environments. He discussed the kinds of plant and mineral deposits in each of these environments.

Changes in the genesis of organic soils begin immediately after man drains and begins to use them (22). Shrinkage and subsidence of deposits starts immediately after drainage. This process is most rapid the first few years and gradually slows down with time. Farnham and Finney (25) reported that an organic deposit will lose approximately one-third of its thickness on drainage. Drainage of the peat beds makes them susceptible to destruction by fires. Dolman and Buol (22,23) estimated that approximately 60 cm of peat had been burned off at one site over a period of 50-odd years.

Most organic soils having low volume weight are of loose consistency. Many, however, show undesirable colloidal characteristics (Dy) (13,17, 44,51,63). Dy formation can be expected when organic deposits are submerged for long periods of time and only anaerobic processes can take place (8,19,71). Organic soils with the undesirable colloidal characteristics of Dy undergo irreversible drying. This poses little trouble until the soils are drained. On drying, they form hard massive layers. Water and air will pass through the cracks that form upon drying, but the soil clods do not absorb the water and remain virtually unaffected. Clods taken from these soils have been soaked in water for more than 6 months without rewetting. The investigators reported that soils with mixtures of organic materials and mineral components throughout the organic tiers have better structure and do rewet after drying. The nature of vegetation did not have a decisive influence on the development of Dy.

Dutch investigators have reported that organic and mineral soils deposited in sea water do not rewet, but that those deposited by river or fresh waters do. Soils deposited in the salt marshes along the Gulf Coast have developed in conditions

favorable for development of irreversible drying characteristics.

Soils such as those of the Maurepas series have brown colors and fairly high content of mineral material through the organic tiers, and lack the high content of amorphous Dy. Conditions in the salt marshes along the southern part of the valley are favorable for soils with undesirable colloidal conditions. Future study or drainage of the coastal salt marshes may uncover problems with such soils.

Genesis of Natric Horizons

The natric horizon is a special kind of argillic horizon. It has, in addition to the properties of the argillic horizon: 1. prismatic or, more commonly, columnar structure, or blocky structure with tongues of an albic horizon extending more than 2.5 cm into the horizon; and 2. in some subhorizons within 40 cm of the upper boundary of the argillic horizon, more than 15 percent saturation with exchangeable sodium. Or, if an underlying C horizon has more than 15 percent saturation with sodium in some part, the natric horizon may have more exchangeable magnesium plus sodium than calcium plus hydrogen in some subhorizon (75).

Much of the earlier work on soils with high contents of sodium was done in arid and semiarid areas (3, 45, 46, 69). These soils have a high content of sodium in the water-soluble bicarbonate form as well as sodium saturation in the cation exchange complex. They usually have electrical conductivity of over 15 mmho per cm (78).

Investigations of high sodium soils in the humid areas have been reported on by Smith (69), Wilding, et al. (79), Fehrenbacker, et al. (26), and Horn, et al. (41). Natric horizons in the humid Southern Mississippi Valley have a low content of soluble sodium and an electrical conductivity of less than 6 mmho per cm, but 15 to about 40 percent of the cation exchange capacity is saturated with sodium. These horizons also have low calcium-magnesium ratios, usually less than 1 (41).

It is probable that minerals such as sodium feldspars in loess are the primary source of sodium and magnesium in these soils (41,79) but the concentrations present appear to be more than would be supplied by feldspars weathering in place. Ahi and Metzger (2) reported as a possible source of the sodium salinization by ground water moving upward from salt-bearing strata, or moving laterally along impervious substrata. Salinization may also be from flood waters wherein salts are precipitated from evaporating water on broad playa-like lakes on the flood plains (41). Investigations of plant opal phytolith distribution in certain Illinois soils (43) suggest that it is not necessary to assume a major climatic change in order to explain the genesis of solonetzic soils.

The aqueous movement and differential segregation of products of weathering utilize a soil-forming process called salt movement, as outlined by Wilding, et al. (79) and by Downey and Odell (24). The salt movement process explains why natric soils and soils without natric horizons can form side by side on landscapes in which the soil age, parent material, and other factors of formation are apparently similar.

The natric soils have well developed albic horizons. Tongues of the albic horizon extend into the argillic horizon. Uncoated silt grains are on the ped surfaces in the upper part of the argillic horizon. The lower part of the argillic horizon has peds with evident clay films. The upper part of the B horizon in Foley soils is acid in reaction and does not have 15 percent sodium saturation, nor more magnesium plus sodium than calcium plus hydrogen. The natric horizon begins at about 20 inches.

Bonn soils have more than 15 percent sodium saturation throughout the argillic horizon. Horn, et al. (41) accounted for differences in depth to the natric horizons by the degree to which the soils have been leached. Restricted drainage and increasing soil dispersion as sodium and magnesium accumulated probably contributed in part to sodium accumulation by preventing its complete removal from the soil by leaching.

CLASSIFICATION OF THE SOILS[1]

Soils are classified according to the comprehensive system adopted by the National Cooperative Soil Survey in January, 1965.

Development of the current system began in 1951. It incorporates knowledge gained from previous systems of classification and overcomes many of the shortcomings of the system published in 1938 (1). A draft of the classification was published for testing in 1960, and a supplement that summarized changes made as a result of testing was issued in 1964. Following additional testing and refinement, a second supplement was issued in March, 1967, which included all changes made since the 1960 publication (5). An unedited copy, entitled Soil Taxonomy, was issued in December, 1970. Work is underway to publish the classification in two parts: definitions of the categories and explanatory material in the system in Soil Taxonomy, and a national placement of soil series into families and higher categories.

The comprehensive system of soil classification was designed to accommodate all known soils. It includes six categories. A category is a group of

1. R. C. Carter, State Soil Scientist, Mississippi, Soil Conservation Service.

taxa defined at a similar level of abstraction and includes the entire population (4). Each is composed of a number of taxa, with the smallest number in the highest category and the largest number in the lowest category. Presently, ten orders are recognized in the highest category and over 10,000 series in the lowest category.

Orders are based on properties that reflect major differences in the genesis of the soils. Each order is divided into suborders, based on soil characteristics that are largely the result of differences in climate or vegetation. The great group category is based on uniformity in kind and sequence of the major soil horizons. Each great group is subdivided into subgroups, which represent departures to other taxa from the central segment of the great group.

The family category is established within a subgroup primarily on properties important to the growth of plants or to the behavior of soils when they are used for engineering purposes.

The soil series is the lowest category in the classification system. It includes soils that are alike in profile characteristics, and have developed in similar parent materials and by the same genetic processes (3). The concept of the pedon was developed to help clarify the relationship of the soil continuum and soil taxonomic classes (2). The pedon is a natural soil body that is large enough to show all the soil horizons present and their relationships. The polypedon is the link between the pedon and the soil taxonomic system; it is defined as one or more contiguous pedons all falling within the defined ranges of a single soil series.

Properties selected as differentiae in the system are soil properties that can be observed in the field or can be inferred from properties observable or can be measured in the laboratory (4).

Soils are classified as they exist today on the basis of quantitatively defined classes and morphological criteria. Soil characteristics that are thought to be the results of genesis are used for the definitions of taxa.

The soils in the Southern Mississippi Valley Alluvium are classified in 5 orders, 11 suborders, 18 great groups, 32 subgroups, 52 families, and 62 soil series (Table 2).

Definitions for the orders, suborders, great groups, and subgroups applicable to the soils in this area are in the following section. Names of families of mineral soils include, in addition to the respective subgroup, the particle-size class, mineralogy class, and soil temperature class. Reaction classes are included for families in Entisols and Aquepts. Families of Histosols include particle-size class, mineralogy, reaction, and soil temperature class. Particle-size and mineralogy classes are applied only to Terric subgroups. Complete definitions for all categories are available in the Comprehensive System of Soil Classification (5).

Pedon descriptions for many of the soil series are included in the chapter on characterization of each major series and in the appendix. Complete descriptions for the soil series are available in the standard series descriptions maintained in offices of the Soil Conservation Service.

Alfisols

Alfisols are mineral soils with ochric epipedons and argillic horizons. They are typically acid but have a moderate to high base saturation. These nearly level to sloping soils are usually moist or are saturated at some season. They occur on the natural levees and older flood plains.

The Aqualfs are wet soils that are seasonally saturated or are artificially drained. They have grayish matrix colors with brownish mottles. Groundwater is near the surface in the high rainfall periods but drops below the argillic horizon in the drier periods. Aqualfs in the Southern Mississippi Valley Alluvium include the Albaqualfs, Glossaqualfs, Natraqualfs, and Ochraqualfs.

Albaqualfs have light-colored albic horizons that rest abruptly over a gray argillic horizon. Groundwater is seasonally perched above the slowly permeable argillic horizon. The Typic subgroup has gray colors dominant.

Glossaqualfs have grayish A2 horizons that tongue into the underlying gray argillic horizons. The Typic subgroup is dominantly gray.

Natraqualfs have natric horizons, i.e. large amounts of sodium within the argillic horizons. The Albic Glossic subgroup has albic materials tonguing or interfingering into the natric horizon that has large amounts of sodium in the lower part. The Glossic subgroup has tonguing or interfingering of the albic horizon into the natric horizon that has large amounts of sodium close to the upper boundary.

Ochraqualfs have light-colored or dark-colored A horizons that are not thick enough to be mollic. They lack an abrupt textural change to the more clayey argillic horizons. The Typic subgroup has gray colors dominant. The Aeric subgroup is less wet and has browner colors in the upper portion of the solum than in the Typic. Vertic Ochraqualfs include wet soils with gray color and soils with browner colors than the Typic. They crack when dry and have high shrink-swell properties. Mollic Ochraqualfs have dark-colored A horizons that are too thin for mollic epipedons.

Udalfs are usually moist, have brownish and reddish colors, and are freely drained. They lack the wetness and seasonal saturation near the surface of the Aqualfs. They are on the higher portions of the natural levees.

Hapludalfs have thin A horizons and finer-textured argillic horizons. The solum is less than 1.5 meters thick. Typic Hapludalfs are well drained and have reddish and brownish argillic horizons. Aquic Hapludalfs have brownish upper argillic horizons with grayish mottles. These argillic horizons are saturated with water at some

Table 2. Classification of the Soils

Series	Family	Subgroup	Order
Adler	Coarse-silty, mixed, nonacid, thermic	Aquic Udifluvents	Entisols
Allemands	Clayey, montmorillonitic, euic, thermic	Terric Medisaprists	Histosols
Alligator	Very-fine, montmorillonitic, acid, thermic	Vertic Haplaquepts	Inceptisols
Amagon	Fine-silty, mixed, thermic	Typic Ochraqualfs	Alfisols
Arkabutla	Fine-silty, mixed, acid, thermic	Aeric Fluvaquents	Entisols
Askew	Fine-silty, mixed, thermic	Aquic Hapludalfs	Alfisols
Baldwin	Fine, montmorillonitic, thermic	Vertic Ochraqualfs	Alfisols
Barbary	Very-fine, montmorillonitic, nonacid, thermic	Typic Hydraquents	Entisols
Beulah	Coarse-loamy, mixed, thermic	Typic Dystrochrepts	Inceptisols
Bonn	Fine-silty, mixed, thermic	Glossic Natraqualfs	Alfisols
Bosket	Fine-loamy, mixed, thermic	Mollic Hapludalfs	Alfisols
Bowdre	Clayey over loamy, mixed, thermic	Fluvaquentic Hapludolls	Mollisols
Bruin	Coarse-silty, mixed thermic	Fluvaquentic Eutrochrepts	Inceptisols
Bruno	Sandy, mixed, thermic	Typic Udifluvents	Entisols
Buxin	Fine, mixed, themic	Vertic Hapludolls	Mollisols
Carlin	Euic, thermic	Hydric Medihemists	Histosols
Cascilla	Fine-silty, mixed, thermic	Fluventic Dystrochrepts	Inceptisols
Caspiana	Fine-silty, mixed, thermic	Typic Argiudolls	Mollisols
Collins	Coarse-silty, mixed, acid, thermic	Aquic Udifluvents	Entisols
Commerce	Fine-silty, mixed, nonacid, thermic	Aeric Fluvaquents	Entisols
Convent	Coarse-silty, mixed, nonacid, thermic	Aeric Fluvaquents	Entisols
Crevasse	Mixed, thermic	Typic Udipsamments	Entisols
Desha	Very-fine, mixed, thermic	Vertic Hapludolls	Mollisols
Dubbs	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols
Dundee	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols
Earle	Clayey over loamy, montmorillonitic, acid, thermic	Vertic Haplaquepts	Inceptisols
Falaya	Coarse-silty, mixed, acid, thermic	Aeric Ochraqualfs	Alfisols
Foley	Fine-silty, mixed, thermic	Albic Glossic Natraqualfs	Alfisols
Forestdale	Fine, montmorillonitic, thermic	Typic Ochraqualfs	Alfisols
Gallion	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols
Goldman	Coarse-silty, mixed, thermic	Aquic Hapludalfs	Alfisols
Guyton	Fine-silty, siliceous, thermic	Typic Glossaqualfs	Alfisols
Hayti	Fine-silty, mixed, nonacid, thermic	Typic Fluvaquents	Entisols
Hebert	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols
Iberia	Fine, montmorillonitic, thermic	Vertic Haplaquolls	Mollisols

Table 2. Classification of the Soils (cont'd.)

Series	*Family*	*Subgroup*	*Order*
Jeanerette	Fine-silty, mixed, thermic	Typic Argiaquolls	Mollisols
Maurepas	Euic, thermic	Typic Medisaprists	Histosols
McGehee	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols
Mer Rouge	Fine-silty, mixed, thermic	Typic Argiudolls	Mollisols
Mhoon	Fine-silty, mixed, nonacid, thermic	Typic Fluvaquents	Entisols
Moreland	Fine, mixed, thermic	Vertic Hapludolls	Mollisols
Morganfield	Coarse-silty, mixed, nonacid, thermic	Typic Udifluvents	Entisols
Newellton	Clayey over loamy, montmorillonitic, nonacid, thermic	Aeric Fluvaquents	Entisols
Norwood	Fine-silty, mixed (calcareous), thermic	Typic Udifluvents	Entisols
Perry	Very-fine, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols
Portageville	Fine, montmorillonitic (calcereous), thermic	Vertic Haplaquolls	Mollisols
Portland	Very-fine, mixed, non-acid, thermic	Vertic Haplaquepts	Inceptisols
Reelfoot	Fine-silty, mixed, thermic	Aquic Argiudolls	Mollisols
Rilla	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols
Robinsonville	Coarse-loamy, mixed, nonacid, thermic	Typic Udifluvents	Entisols
Rosebloom	Fine-silty, mixed, acid, thermic	Typic Fluvaquents	Entisols
Sharkey	Very-fine, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols
Sterlington	Coarse-silty, mixed, thermic	Typic Hapludalfs	Alfisols
Tensas	Fine, montmorillonitic, thermic	Vertic Ochraqualfs	Alfisols
Tiptonville	Fine-silty, mixed, thermic	Typic Argiudolls	Mollisols
Tunica	Clayey over loamy, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols
Tutwiler	Coarse-silty, mixed, thermic	Typic Hapludalfs	Alfisols
Una	Fine, mixed, acid, thermic	Typic Haplaquepts	Inceptisols
Vicksburg	Coarse-silty, mixed, acid, thermic	Typic Udifluvents	Entisols
Wardell	Fine-loamy, mixed, thermic	Mollic Ochraqualfs	Alfisols
Waverly	Coarse-silty, mixed, acid, thermic	Typic Fluvaquents	Entisols
Zachary	Fine-silty, mixed, thermic	Typic Albaqualfs	Alfisols

season. Mollic Hapludalfs have thin, dark-colored A horizons that are not thick enough for mollic epipedons.

Entisols

Entisols are mineral soils with little or no evidence of development. Ochric epipedons are dominant, but one class of Entisols has a histic epipedon. Some soils have buried A and B horizons. Most of the Entisols are on flood plains that receive fresh deposits from flooding. They are nearly level to gently sloping.

Aquents are wet soils. They are seasonally saturated at some period, artificially drained, or permanently saturated. Gray colors are dominant, with brownish mottles. Aquents include the Fluvaquents and Hydraquents.

Fluvaquents are wet soils of the flood plains. They usually have fine stratifications from deposition of sediments. They are relatively high in

organic matter. Typic Fluvaquents have water tables near the surface most of the year, unless they are artificially drained. Aeric Fluvaquents are less wet and have browner colors in the upper part of the soil.

Hydraquents are permanently saturated with water. They are clayey soils of the marshes. They have never been dry and have colors of bluish gray to greenish gray. Typic Hydraquents have too low soil strength to support grazing by animals.

Fluvents lack the wetness of Aquents. They are brownish to reddish in color and have formed in recent sediments deposited in the flood plains. Fluvents have stratification of materials and moderately high organic matter content.

Udifluvents are usually moist. They are near the stream channels of the flood plains and receive fresh deposits from flooding unless protected. Typic Udifluvents are on the high part of the flood plains. They have no grayish mottles due to wetness within the upper part of the soil. Aquic Udifluvents have dominantly brownish colors with some grayish mottles in the upper part of the soil. This horizon is saturated with water during some seasons or is artifically drained.

The Psamments are sandy soils of the flood plains. Udipsamments are usually moist, are freely drained, and have some weatherable minerals.

Histosols

Histosols include those soils that are dominantly organic. They are saturated or nearly saturated with water most of the year unless they have been drained. Histosols are in the freshwater marshes unless affected by tides, in which case they are brackish or saline.

Hemists are dominated by partially decomposed organic materials. Fiber contents before rubbing between the fingers are one-third to more than two-thirds of the organic volume. The fibers are largely destroyed by rubbing.

Medihemists have organic materials from mixtures of herbaceous and woody plants. Hydric Medihemists have layers of water within the organic materials. The organic materials float on the water.

Saprists consist of almost completely decomposed organic materials. Fiber content is less than one-third of the organic volume before rubbing. Saprists occur in areas where the groundwater fluctuates; however, they are saturated most of the time.

Medisaprists have decomposed organic materials from herbaceous and woody plants. Typic Medisaprists have thick continuous organic materials. Terric Medisaprists have thinner organic layers over mineral soil.

Inceptisols

Inceptisols are mineral soils that have altered horizons. They have ochric epipedons and cambic horizons. They are freely to poorly drained. These soils occur on the flood plains and natural levees.

Aquepts are wet, nearly level soils. They are saturated with water at some period of the year or have been artificially drained. They are on the lower part of the flood plains and grayish colors are dominant.

Typic Haplaquepts are gray, fine-textured soils that do not have wide cracks when dry. The organic matter content decreases with depth and is fairly low in the lower part of the cambic horizon. Vertic Haplaquepts are fine-textured soils that crack when dry and swell when wet. The clay is dominantly montmorillonite.

Ochrepts are soils with brownish colors. They are freely drained and not as wet as the Aquepts. They have formed on higher elevations of the flood plains and low natural levees.

Dystrochrepts are acid soils with low to moderate base saturation and no carbonates. Typic Dystrochrepts are well drained soils that have relatively low organic matter content that decreases regularly with depth. They lack stratification of materials. Fluventic Dystrochrepts are on flood plains and have formed in alluvium. The content of organic matter is fairly high.

Eutrochrepts have brownish colors in the cambic horizon. They are nonacid and have moderate to high base saturation. The Fluvaquentic Eutrochrepts have grayish mottles due to wetness in the upper part of the soil. They are saturated with water at some season or are artifically drained. They have a relatively high content of organic matter.

Mollisols

Mollisols are mineral soils that have a mollic epipedon. They have cambic or argillic horizons. They are rich in bases and have moderate to high base saturation. Mollisols are on the flood plains and natural levees.

Aquolls are naturally wet and have grayish colors with brownish mottles. They are saturated at some season of the year or are artifically drained. Argiaquolls and Haplaquolls also occur in this area.

Argiaquolls are wet, nearly level soils that have an argillic horizon. They are on the lower-lying, natural levees. Typic Argiaquolls have silty textures and do not have wide cracks when dry.

Haplaquolls are wet, nearly level soils that have grayish cambic horizons with brownish mottles. They are on the lower portion of the flood plains. Vertic Haplaquolls are clayey soils that have deep wide cracks when dry and have high shrink-swell properties.

Udolls are not saturated with water at any period or lack the wetness of Aquolls. They have cambic or argillic horizons and are on the higher part of the natural levees and flood plains. They are nearly level to gently sloping.

Argiudolls have an argillic horizon that has brownish or reddish colors. They are on the

natural levees. Typic Argiudolls have no evidence of wetness in the upper part of the soil. Aquic Argiudolls have grayish mottles due to saturation with water at some period within the upper part of the soil.

Hapludolls have a brownish or reddish cambic horizon. They are on the flood plains but receive little fresh sediment from overflow. Aquic Hapludolls have grayish mottles due to wetness. They have a shallow water table at some season or have been artifically drained. Vertic Hapludolls have clayey textures and deep, wide cracks when the soil is dry and high shrink-swell properties.

CHARACTERIZATION OF REPRESENTATIVE SOIL SERIES

Soils of the Southern Mississippi River Valley alluvium have been characterized by means of detailed descriptions and analytical data for each of 32 representative pedons; 15 of these are included in the main body of this bulletin while the remaining 17 are in the appendix as additional source-data for the region. Soil series are representative of three orders: Entisols, Inceptisols, and Alfisols. A detailed profile description is presented for each horizon in the profile by its physical, chemical, and mineralogical properties. The morphological description of each pedon is given by horizon and is presented in the format used by the SCS Soil Survey Correlation staff of the Southern region. The morphology of these pedons is not discussed in detail in this section of the report since it has been covered in the previous sections on soil classification and the soil genetic processes characteristic of these soils.

Physical Properties[1]

The soils of the delta region exhibit extreme differences in physical properties, ranging from structureless, droughty-sandy soils to fine textured-clayey soils frequently characterized by their poor drainage and almost unmanageable physical properties. The extreme variability in these soils is largely due to the great variation in particle size distribution. The textural differences are manifested in many ways, including the ease of tillage, porosity, available water-holding capacities, permeability and compaction, fertilizer efficiency, and crop adaptability. Adaptation of the soils to non-farm uses such as the construction of highways and industrial buildings also presents problems because of their textural differences.

The physical and morphological properties of representative pedons of the region are given in Tables 6 to 20 and in Appendix Tables 1 to 17. These data show that the physical and morphological features of the soils of this alluvial area are quite extreme.

The mechanism of alluvial deposition has resulted in a complete range of soil textures from the loamy sands of the Crevasse series which occur on undulating topography with excessive drainage to the Sharkey clay series which is poorly drained. In between these textural limits exist a host of soil series associations that vary only moderately in their textural properties. No soils, however, contain more than 35 percent by volume of skeletal material coarser than 2 mm.

The oldest of these soils fall under the order of Alfisols which are characterized by such morphological features as gray to brown surface horizons and significant clay accumulation in the subsurface horizons. Changes in clay content with depth for selected pedons are given in Figure 5. Well-drained pedons in this order include such series as Bosket loamy fine sand, Dubbs silt loam, and Tutwiler fine sandy loam, which occur on the natural levees. The medium-textured soils such as Goldman and Dundee are somewhat poorly drained soils that also show a more gradual change in clay accumulation from the A horizon to the subsurface horizons. The Foley series, occurring on the terrace position, show an accumulation of sodium in addition to being poorly drained.

The intermediate-aged soils of the region (Inceptisols) are characterized by weakly differentiated horizons but not to the extent that visible accumulation of clay or altered products has occurred. The dominant series in this order vary somewhat less in their textural classification and in their degree of internal drainage than do the soils included within the Alfisols. Typical soils occurring on the flood plains are the Sharkey and Alligator series which have poor internal drainage. The Beulah series represents soils that are well drained.

The region also includes soil series that show no clearcut pedogenic horizon development (Entisols). The Robinsonville series represents a well drained soil on the flood plains, while the coarse-textured Crevasse series represents an excessively drained soil occurring on an undulating topography with slopes varying from 2 to 3%. The Commerce and Arkabutla series are somewhat poorly drained, while the Mhoon series are poorly drained soils on the flood plains.

In the extreme southern portion of the valley are lowland and swamp areas whose soils are fine textured and possess a relatively high percentage of organic matter; they are highly base-saturated and generally exhibit black friable surface horizons (Mollisols). This order includes such series as Iberia, Reelfoot, and Buxin which are poorly to somewhat poorly drained. Data for typical pedons of this order are not included in this report.

1. D. A. Brown, Arkansas Agricultural Experiment Station.

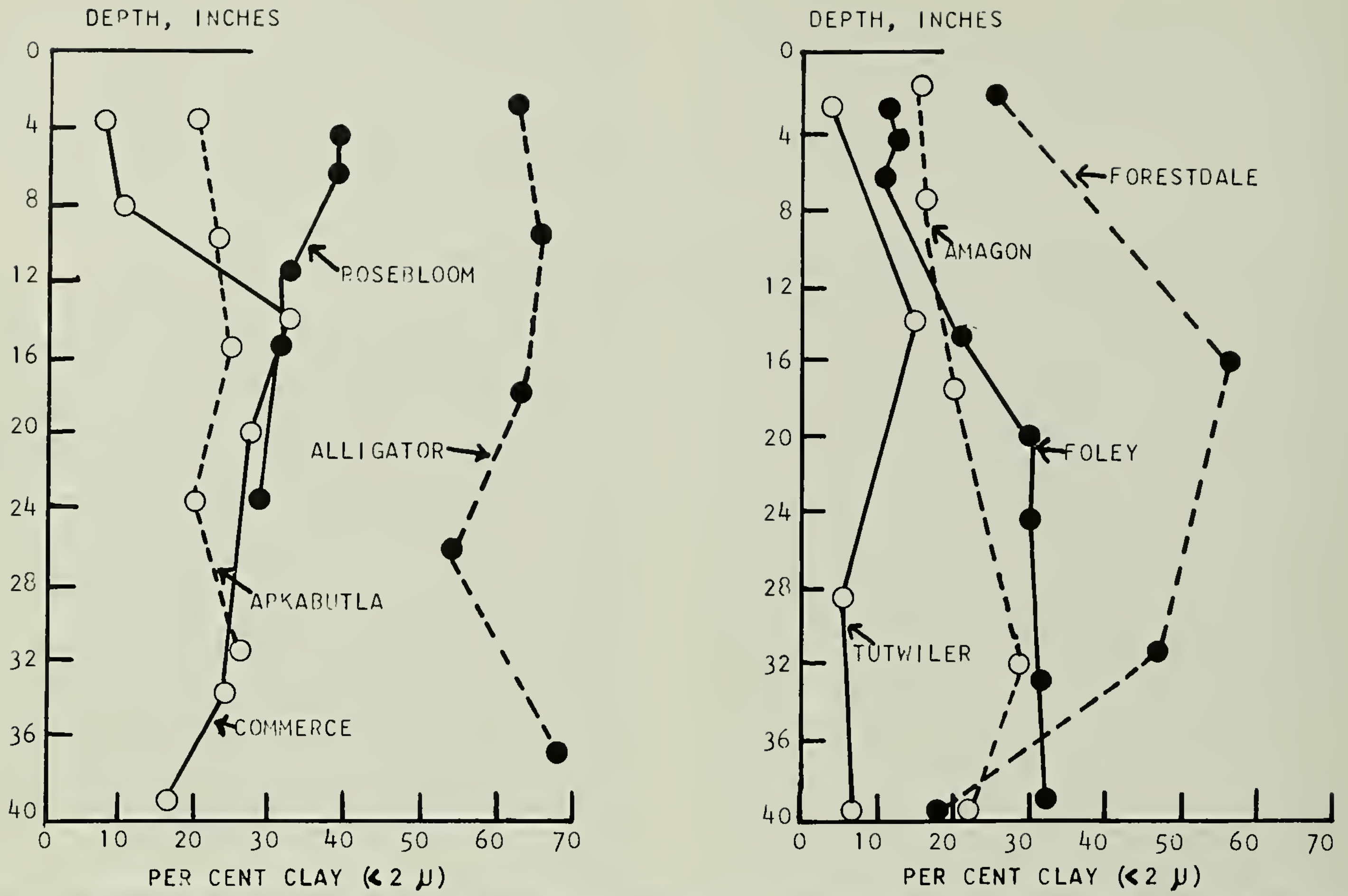

Fig. 5. Distribution of Clay with Soil Depth for Representative Pedons of the Southern Mississippi River Valley

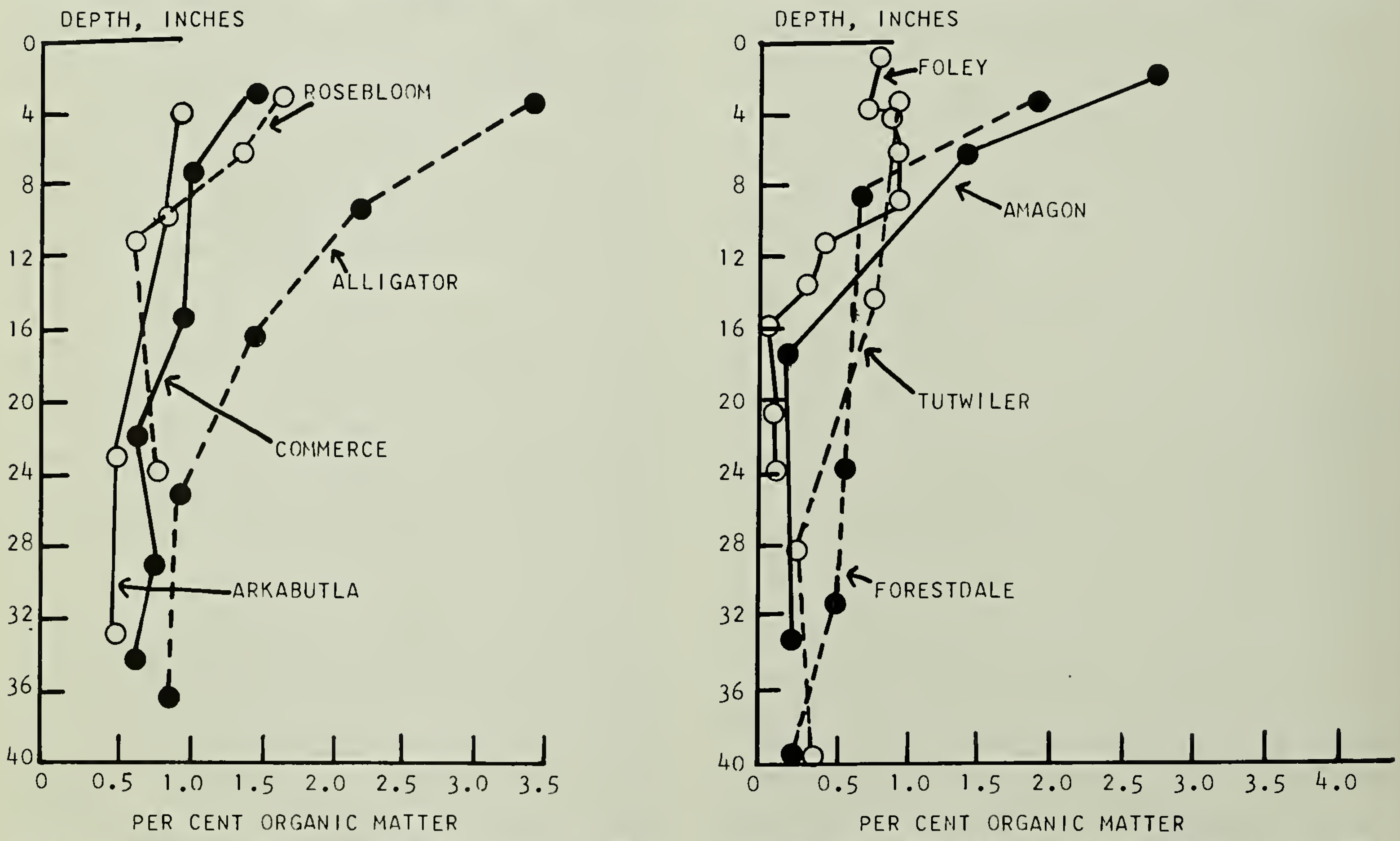

Fig. 6. Distribution of Organic Matter with Soil Depth for Selected Pedons of the Southern Mississippi River Valley

Changes in the percentage of organic matter with soil depth for selected pedons are shown in Figure 6. Most of these soils, except for the Alligator series which has a relatively high percentage of organic matter (3.5% in the surface horizon), exhibit a relatively low organic matter content, generally 1.3% or less with the percentage decreasing rapidly with depth. The relatively low amount of organic matter in the surface horizon contributes significantly to management problems in the preparation of suitable seedbeds, in cultivation, and in such properties as moisture retention, internal drainage, and aeration in many of the soils.

Bulk Density

The degree of soil compaction, expressed in terms of bulk density for representative pedons of the region is given in Tables 6 to 20 and Appendix Tables 1 to 17. Bulk density values for selected pedons are shown graphically in Figure 7. Dundee shows the most significant change with depth, the values ranging from 1.35 in the surface horizon to 1.59 at the 8-inch depth. Tutwiler shows only a modest increase in bulk density with depth, while Forestdale continues to increase at depths below 12 inches. Bulk density values increase with depth, in some cases rather erratically; however, there is no indication that bulk density values within the primary rooting depth of cultivated crops limit root growth. However, the data of Clower and Patrick (4) indicate that bulk density values for Commerce and Dundee soils may restrict moisture recharge, particularly where plow pan formations exist.

Moisture Characteristics

The range in moisture content for selected pedons of the region is reported for each major horizon of each profile in Tables 6 to 20. Moisture values for a selected number of these pedons are illustrated in Figure 8, expressed as inches of available water per inch of soil depth throughout the profile. The calculations are based upon bulk density values in an oven-dry moisture condition. Dundee shows the greatest change, decreasing from 0.18 inch to about 0.10 inch of water at the 8-inch depth. Tutwiler and Forestdale decrease gradually from 0.2 to about 0.05 inch for Tutwiler and to 0.14 for Foresdale. Soils in the Alfisols order show fairly constant moisture values with change in depth, averaging about 0.15 inch per inch of soil throughout the profile.

Engineering Properties

Physical and morphological data for soils of the delta indicate an extreme variation in usability of these soils for non-farm purposes. The range in degree of limitations which these alluvial soils possess in terms of providing resource ma-

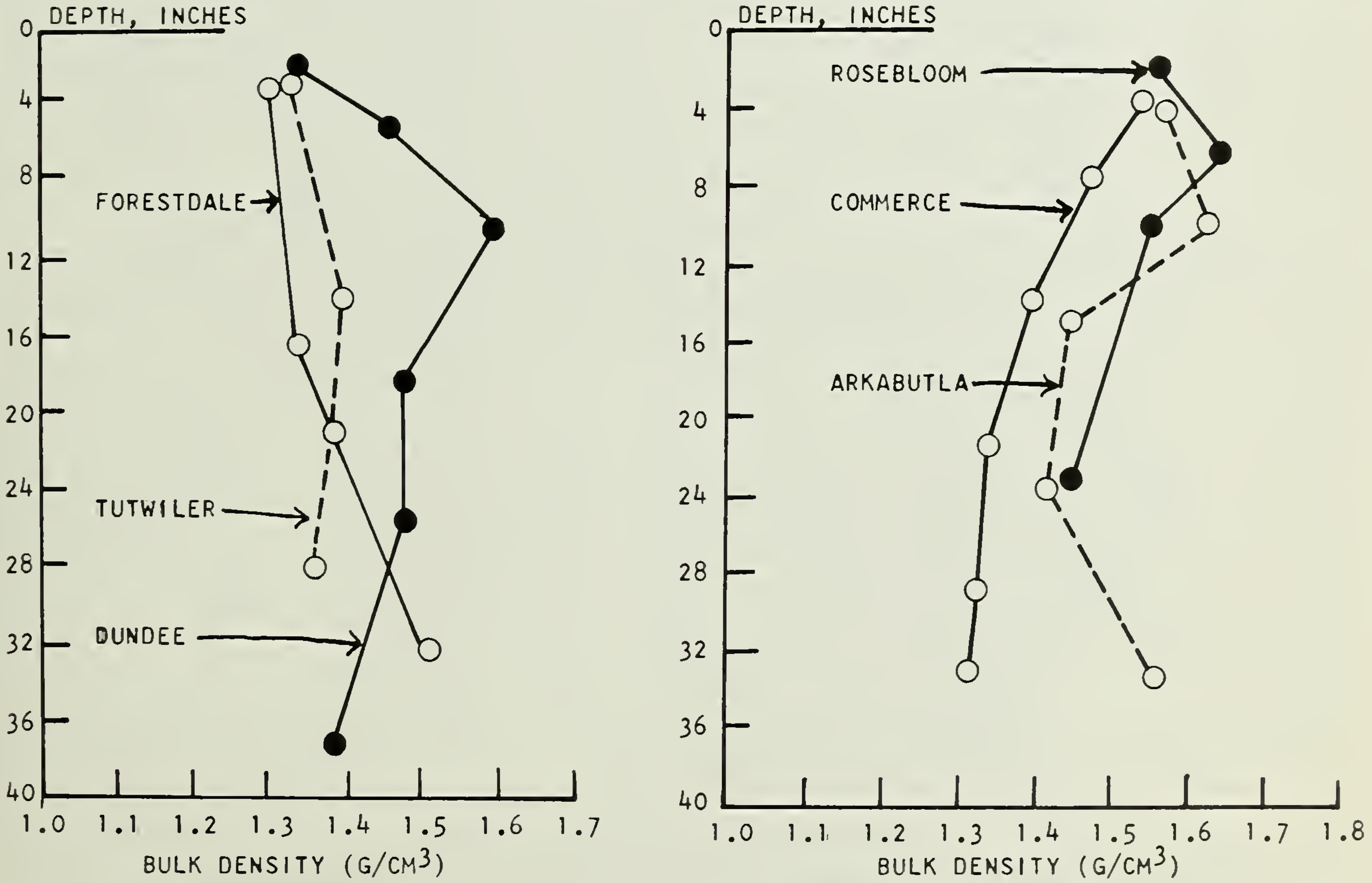

Fig. 7. Changes in Bulk Density Values with Depth for Selected Pedons of the Southern Mississippi River Valley

terials for such non-agricultural uses as highways, buildings, water storage, or organic waste-disposal ponds is illustrated by the descriptions in Table 3. A more extensive interpretation of the non-farm use of the region's soils is presented under the discussion of the area's soil map (see page 62). Additional information can be found in Arkansas Highway Report Series 19 and from the official soil description-data sheets provided by the Soil Conservation Service. Critical engineering test data for nine representative soil series of the region, selected from Arkansas Highway Report 19, are given in Table 4.

Alligator and Sharkey soils possess physical, chemical, and mineralogical properties that severely limit their use in industrial types of construction. The high clay content and high proportions of expanding-type clay minerals give rise to extreme volume changes, low shear strength, and high compressibility. The poor internal drainage further limits the bearing strength for industry and the traffic-bearing capacity in highway use. The wetness of these soils is conducive to a high degree of corrosion of uncoated steel. They are severely limited for use as filter fields for septic tanks.

Bosket soils possess contrasting engineering properties to those of the Sharkey soils. These soils are relatively low in percent clay and in the expanding-type clay minerals and therefore experience less volume changes on wetting and drying. Their internal drainage is good, resulting in only slight to moderate limitation as resource material for industrial uses. Engineering properties such as plastic index, liquid limit, and ASSHO indexes are in contrast to those of Sharkey soils and are indicative of the relative problems encountered in use of these soils as resource materials for industrial uses.

Physical properties of such other soils as Arkabutla, Commerce, Dundee, and Amagon place them in an intermediate position between the Alligator and Bosket soils as resource materials for industrial use.

These data indicate that a thorough analysis of the physical, chemical, and mineralogical properties of delta soils is mandatory if serious problems are to be avoided in their industrial use.

Chemical Properties[2]

Differences in age of the sediments may account for much of the contrast in profile develop-

2. A. G. Caldwell, Agronomist, Louisiana Agricultural Experiment Station.

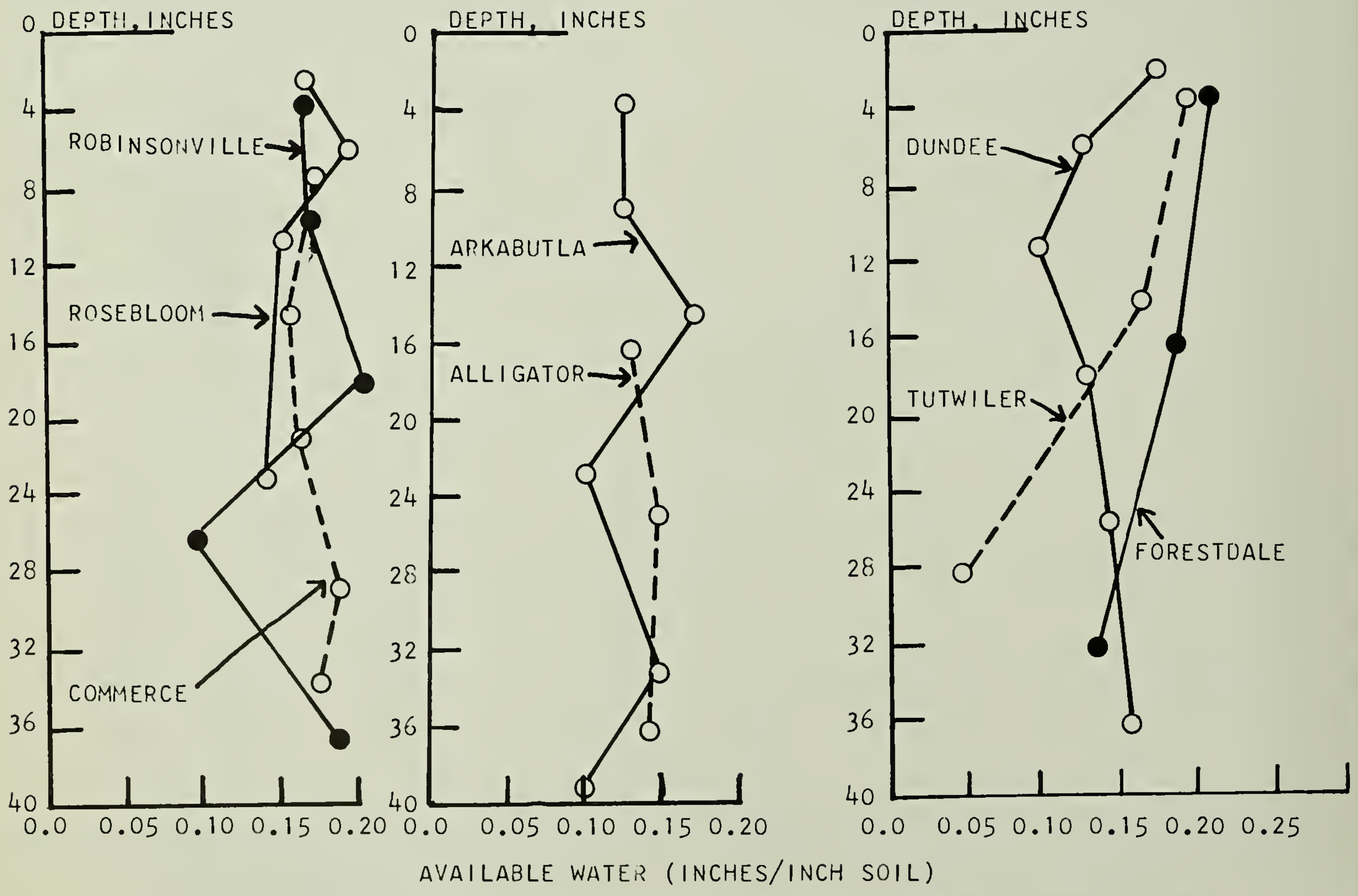

Fig. 8. Distribution of Available Water with Soil Depth for Representative Pedons of the Southern Mississippi River Valley

Table 3. Degree of Limitation in Soil Properties of Selected Soil Series for Their Use as Industrial Resource Materials[1]

Soil series	Erosion: cuts or fills	Source of borrow	Excavation	Compaction	Highway and or light industries
Alligator	Usually not a problem, may slide if used in embankments	Very poor	Usually difficult; wet sticky clay	Difficult to obtain; narrow range of optimum moisture. High potential volume change. Lumpy when dry	Severe; wetness, high shrink and swell potential
Amagon	Serious on both cut and filll slopes	Poor	Difficult; high water table. Sticky subsoil	Difficult unless moisture carefully controlled; pneumatic rollers preferable	Severe; wet, flood hazard
Arkabutla	Moderate to severe on cut slopes	Fair	Easily made above water table	Difficult unless moisture closely controlled	Slight; somewhat poorly drained
Bosket	Serious on both cut and fill slopes	Generally good	Easily made	Not difficult at optimum moisture; heavy tamping recommended	Slight; well drained surface horizons
Commerce	Often severe on cuts or slopes	Poor	Difficult; high water table	Difficult unless moisture carefully controlled	Slight; slow surface runoff
Dundee	Moderate on cut slopes	Good	Easily made above water table	Not difficult at optimum moisture	Severe; wet, poorly drained
Foley	Upper 2 feet very susceptible to erosion	Poor	Difficult; high water table. Sticky subsoil	Difficult unless moisture closely controlled. Soil material below 2 feet difficult to handle	Severe; poorly drained; moderate shrink-swell potential, corrosive to building foundations
Forestdale	Usually not a problem; may slide if used in embankments	Very poor to 30", fair below	Usually difficult; wet sticky clay	Difficult to obtain; narrow range of optimum moisture. High potential volume change. Lumpy when dry	Severe; wet, slow to moderate drainage
Sharkey	Usually not a problem; may slide if used in embankments	Very poor	Usually difficult; wet sticky clay	Difficult to obtain; narrow range of optimum moisture. High potential volume change. Lumpy when dry	Severe; wet, high shrink-swell potential

[1]Based on *Soil Survey Interpretation Reports*, U. S. Dept. Agr. Soil Conservation Service and official series description sheets for each series.

Table 4. Engineering Test Data for Selected Soils of the Southern Mississippi River Valley[1]

Soil series and location	Horizon depth, in.	% less than 200	% LL	% PI	ASSHO	Maximum density, g/cm³	Optimum moisture, %
Alligator, clay (Miss. Co. Ark.)	C2g: 20-51" C3g: 51-74"	97 98	62 63	33 40	A-7-6(24) A-7-6(28)	91 98	28 23
Amagon, sil (Woodruff Co. Ark.)	B1: 14-28" B21: 28-40"	78.6 77.5	25 42	4 20	A-4(8) A-7-6(14)	114.7 107.0	14.1 17.7
Arkabutla, sil (Cross Co. Ark.)	C1g: 13-20" C3g: 36-72"	97 96	26 34	6 12	A-4(8) A-6(9)	105.9 108.3	17 16
Bosket, fsl (Woodruff Co. Ark.)	B2t: 14-34" C: 34-72"	40.0 41.2	30 —	8 NP	A-4(1) A-4(2)	111.2 113.5	16.2 14.1
Commerce, sil (Desha Co. Ark.)	B21: 14-22" C1: 39-55"	96 97	36 30	12 5	A-6(9) A-4(8)	106 105	18 18
Dundee, sil (Chicot Co. Ark.)	A12: 6-13" B3: 20-49"	90 97	28 29	7 5	A-4(8) A-4(8)	108 104	17 19
Foley, sil (Woodruff Co. Ark.)	B22tg: 22-42" C: 42-72"	98.5 94.2	58 55	34 29	A-7-6(24) A-7-6(21)	96.5 94.7	22.3 25.6
Forestdale, sicl. loam (Miss. Co. Ark.)	Ap: 0-8" B22tg: 20-34"	92 97	56 48	23 22	A-7-5(18) A-7-6(16)	90 99	21 22
Sharkey, clay (Miss. Co. Ark.)	C1g: 6-34"	98	75	43	A-7-5(32)	86	30

[1]Arkansas Research Project No. 19, Dept. of Agron. and Ark. State Highway Dept. in cooperation with the U. S. Dept. of Transportation, Federal Highway Adm., and Bureau of Public Roads; Technical Reports: Alligator, Miss. Co., #7 (1968); Amagon, Woodruff Co., #3 (1967); Arkabutla, Cross Co., # 2 (1966); Bosket, Woodruff Co., #3 (1967); Commerce, Desha Co., #10 (1969); Dundee, Chicot Co., #6 (1968); Foley, Woodruff Co., #3 (1967); Forestdale, Miss. Co., #7 (1968); Sharkey, Miss. Co., #7 (1968). For a complete summary on engineering properties of these soils, see the Final Rpt. No. 19, 1969, Agron. Dept., Univ. of Ark.

ment found in soils of the Mississippi Delta, according to Bartelli and Weems (2). This seems to be confirmed by the pH of selected soil profiles (Figure 9). Fresh alluvial sediments and young soils, such as Convent and Commerce, are high in bases and contain free carbonates at the surface or at shallow depths. Bruin soils are leached somewhat more deeply but contain free carbonates at about 30 inches. Dundee appears to be very deeply leached as indicated by a soil pH of 6.0 at 80 to 90 inches. It is possible that these soils were laid down with sediments largely derived from more acid areas, such as the upper Ohio and Tennessee valleys. However, observations of samples of Dundee and Commerce from Tensas Parish, La. (7) confirm the similarity of the soil matrix of minerals.

The cation exchange capacity of these alluvial soils is closely related to their clay content. Probably because of the high proportion of montmorillonite in the clays the cation exchange capacity seems to be nearly one milliequivalent per hundred grams for each percent of clay present. In Figure 10 one can see that the coarser-textured Robinsonville and Commerce soils have moderate cation exchange capacities; the finer-textured Alligator and Sharkey pedons have much higher capacities.

Calcium dominates the exchangeable cations in most of the pedons analyzed. The ratio of calcium to magnesium is generally greater than 2 except in the B2t of Foley and Forestdale pedons. The low value in Forestdale is for an horizon in which the exchange positions are 10 percent saturated with sodium. The ratios in the sodic B2t of the Foley are as low as 0.1, as illustrated in Figure 11. The upper part of this pedon, not dominated by sodium, is quite acid with a base saturation as low as 33 percent. Rarely is base saturation as low as 50 percent found in other pedons. The youngest soils are highly base saturated even at the surface; in most others the base saturation increases with depth more or less in accord with pH. A soil intermediate in development is Dundee (pedon no. 28). Its base saturation ranges from 81 to 94 percent (Figure 12).

Total potassium content of soils from the Mississippi Alluvial Valley has been shown to be high,

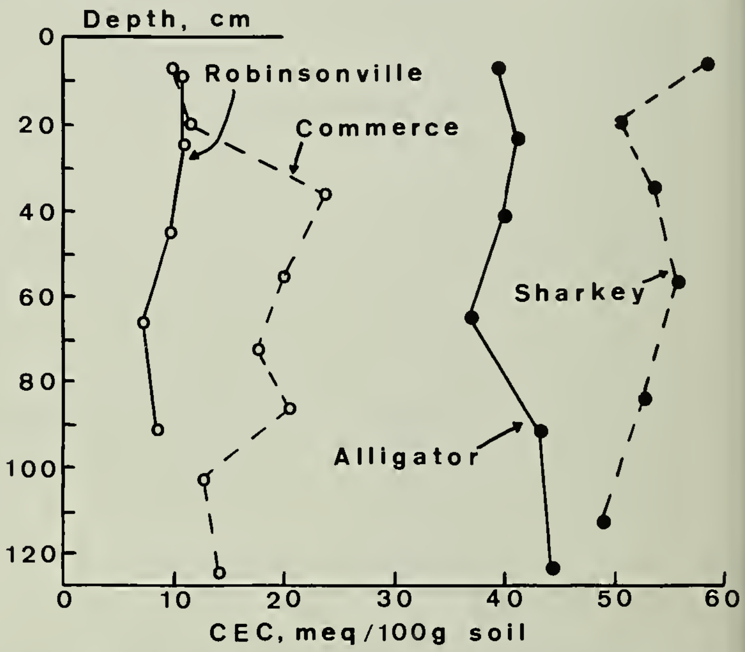

Fig. 10. Cation Exchange Capacity with Depth of Representative Pedons with Coarse (Robinsonville), Medium (Commerce), and Fine Textures (Alligator, Sharkey)

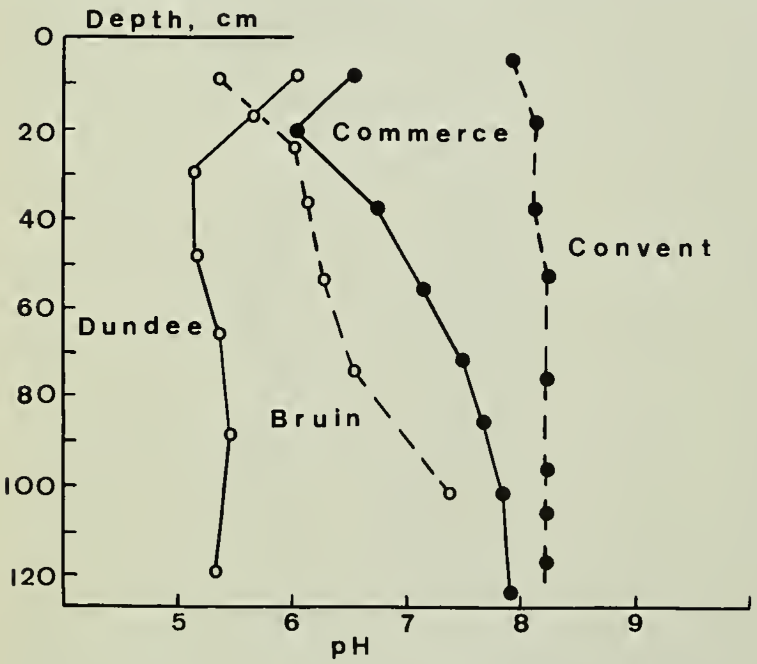

Fig. 9. The pH with Depth of Representative Entisols (Convent, Commerce), Inceptisols (Bruin), and Alfisols (Dundee)

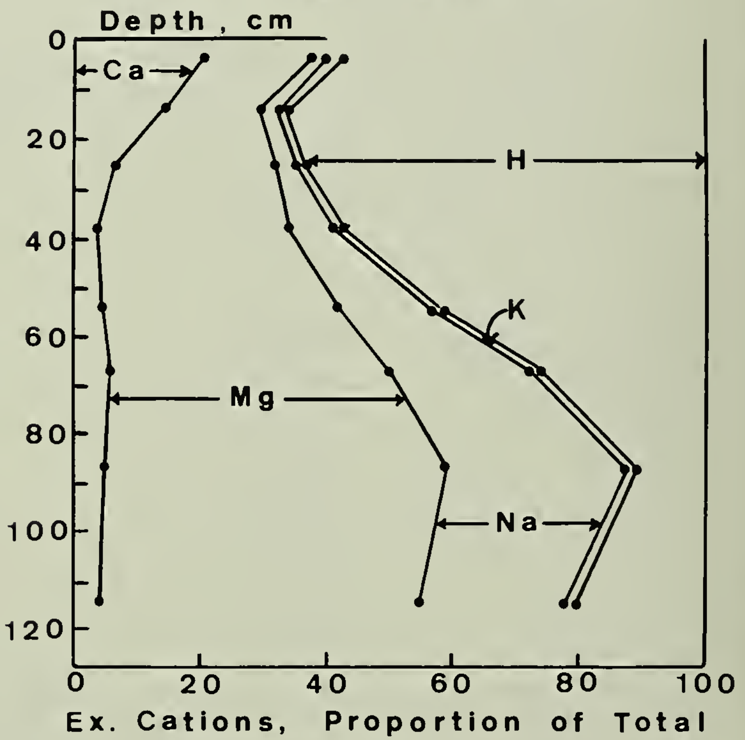

Fig. 11. Proportionate Distribution of Exchangeable Cations with Depth in a Profile of Foley Silt Loam, a Representative of the Albic Glossic Natraqualfs

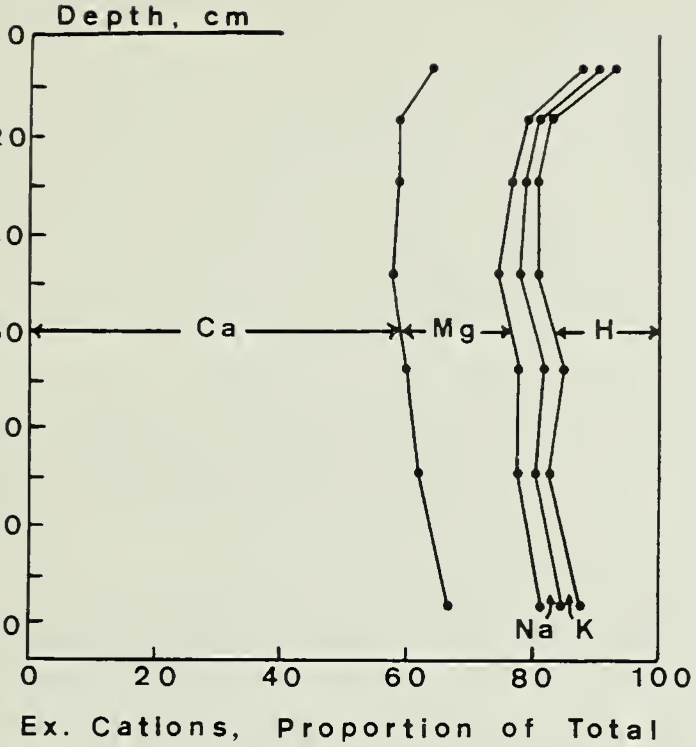

Fig. 12. Proportionate Distribution of Exchangeable Cations with Depth in a Profile of Dundee Silt Loam, a Representative of the Aeric Ochraqualfs

ranging from 1.7 to 2.2 in a number of samples analyzed by Deo (5) and Ahmed (1). About three-fourths of this total is present in feldspars, mainly in the sand and silt fractions. Mica makes up the other fourth. The amount of mica is highly related to the clay content. It accounted for more than half the potassium in Sharkey pedon no. 30. Bomers (3) found a very high correlation ($r=0.876$) between micaceous potassium in soils and their ability to release potassium over time. Commerce and Sharkey soils were especially efficient in continuing to release potassium.

The phosphorus fractions of some of the pedons were measured by Adhate.[3] He found that in an Entisol, Commerce pedon no. 27, about 80 percent of the inorganic phosphorus was present as calcium phosphate and only 12 percent as iron phosphate. In Sharkey pedon no. 30, 45 percent of the inorganic phosphorus was in the calcium form and 32 percent in the iron form. In an Alfisol, Dundee pedon no. 28, the percent in the calcium form was only 40 while 39 percent was in the iron form. This seems to indicate a tendency for phosphorus to be present in the calcium form in the young calcareous soils. The calcium phosphate probably decreases with weathering and is converted to a form of iron phosphate.

In another study Mahapatra (6) found less than 10 percent of the phosphorus in a more weathered Olivier soil as calcium phosphate whereas 75 to 80 percent was in less available iron forms. None of his samples from Mississippi River alluvium were that low in calcium phosphates or that high in iron phosphates.

Bray's weak acid fluoride reagent (P_1) extracts mostly aluminum and calcium-bound phosphorus. Bray's P_2 extracts the more strongly-bound calcium phosphate and probably some iron-bound phosphates as well. The highest phosphorus values obtained by his methods are in the recent Missisippi River alluvial soils, such as Robinsonville pedon no. 18 and Commerce pedon no. 27. The very high P_2 tests probably indicate that large amounts of tricalcium phosphate are being dissolved. In most of these younger soils much more phosphorus was extracted by the P_2 than by the P_1 tests. The differences were much less in the moderately developed Alfisols, such as Dundee pedon no. 28, Forestdale pedon no. 17, and Tutwiler pedon no. 16. Most of the pedons would be rated as high in available phosphorus. Exceptions would be pedon numbers 12, 16, 25, 28, 29, and 32 which would rate medium, and pedon number 24 which would rate as low. The soils with high P_2 tests will probably be well supplied with plant-available phosphorus for many years.

Mineralogical Properties[4]

The sediments from which these soils were formed have a diverse origin. Since they were carried by the Mississippi River, they may have originated anywhere in the drainage area from Montana to Pennsylvania. Many of the minerals came from the geologically young glacial deposits of the northern and northwestern states and the semi-arid region of the West and are fresh and unweathered. On the other hand, sediments from the Appalachian Mountains and the Cumberland Plateau may be highly weathered. The wide range in the sources of the sediments results in an equally diverse soil mineralogy, both vertically and horizontally. One would expect, in particular, a great variety of minerals in the coarse silt and sand fractions. Unfortunately, our mineralogical data on the sand and silt is limited. J. Dement[5] has studied the micromorphology of two Commerce and Dundee profiles from Tensas Parish, Louisiana, by optical microscopic analysis of thin sections. The sand was composed of quartz and feldspars. The coarse silt was made of quartz, feldspar, mica, and a variety of heavy minerals. A large percentage of the coarse and medium sand was ferromagnesium minerals but the quantity of these fractions was small. DeMent found little difference in the mineralogy of the sand and silt with depth or between soils, the only exception being the presence of calcite in the lower part of the Commerce profile.

The fine sand fractions of the Mississippi soils were separated into four specific gravity groups. The average percentages and ranges in each

3. Adhate, S. M., 1966, unpublished data, Louisiana Agricultural Experiment Station.

4. V. E. Nash, Agronomist, Mississippi Agricultural and Forestry Experiment Station.
5. Unpublished data.

Table 5. Average Distribution of Sand Separates According to Specific Gravity for Eight Alluvial Soils from Mississippi

Sand size (microns)	Percentage in each specific gravity range			
	2.50	*2.50 to 2.70*	*2.70 to 2.95*	*2.95*
50 to 100[1]				
Average	1.3	85.6	2.8	
Range	0.4 to 3.0	79.4 to 92.5	1.4 to 4.5	1.2 to 14.4
100 to 250[2]				
Average	1.3	93.1	2.71	2.8
Range	0.4 to 3.2	91.8 to 94.2	1.7 to 3.7	1.6 to 4.0

[1]Thirty-seven horizons examined.
[2]Six horizons examined.

group are shown in Table 5. Although the range values indicate extreme variation in some cases, most values were near the average. The lightest group (<2.50) was composed of plant opal. Most of the minerals are in the 2.50 to 2.70 specific gravity range, which is predominantly quartz and smaller amounts of microcline, orthoclase, albite, and biotite. Biotite, hornblende, and muscovite were identified in the 2.70 to 2.95 fraction. The heavy mineral (>2.95) group consisted of a great variety of minerals with zircon, tourmaline, hornblende, ilmenite, staurolite, and opaques being particularly prominent.

Qualitative and semi-quantitative analyses of the minerals in the fine silt and clay fractions have been determined by x-ray diffraction analysis for many soils of the Delta region. These results are recorded in the tables, and typical x-ray diffraction patterns are shown in Figures 13, 14, and 15. X-ray diffraction patterns are for a Robinsonville soil from Washington County, Mississippi, and a Forestdale soil from Coahoma County,

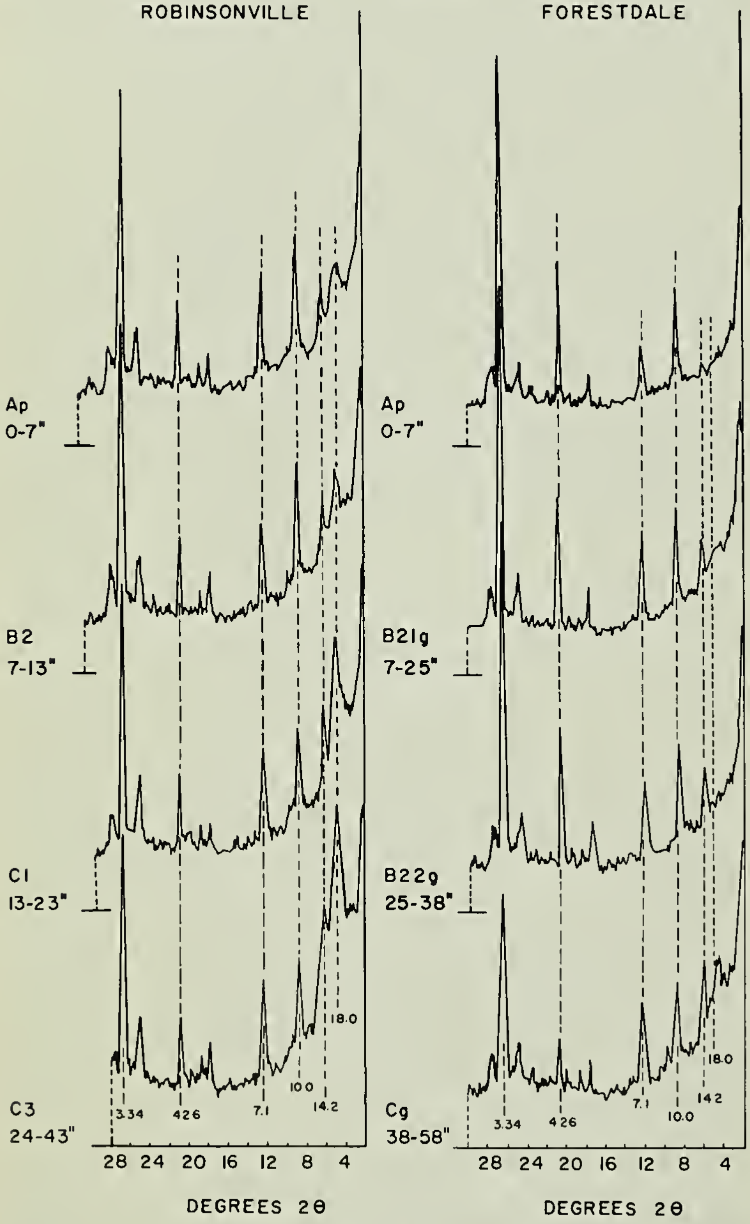

Fig. 13. Smoothed X-ray Diffraction Patterns of Oriented Silt (2-4 microns) from Forestdale and Robinsonville Pedons, Mg-saturated and Glycerol-solvated

Fig. 14. Smoothed X-ray Diffraction Patterns of Oriented Clay (2-0.2 microns) from Forestdale and Robinsonville Pedons, Mg-saturated and Glycerol-solvated

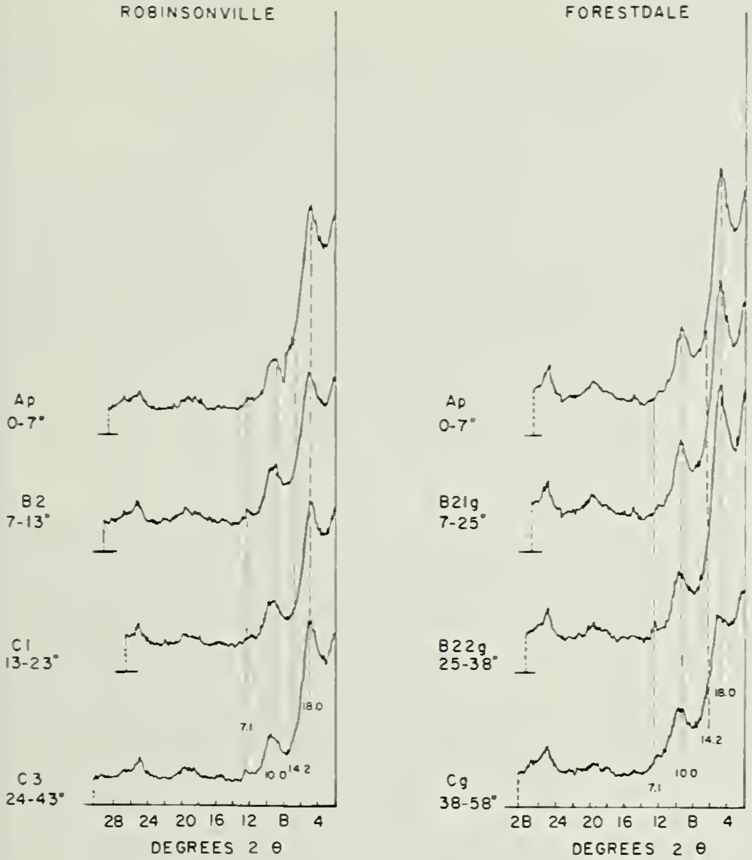

Fig. 15. **Smoothed X-ray Diffraction Patterns of Oriented Clay (less than 0.2 microns) from Forestdale and Robinsonville Pedons, Mg-saturated and Glycerol-solvated**

Mississippi. The Robinsonville is a coarse-textured soil deposited near the stream channel, while the Forestdale was deposited farther away from the channel and contains more clay. They were selected to represent the maximum variation in mineralogy of the fine fractions observed.

The fine silt fractions have the greatest variation in mineral species (Figure 13). For most of the soils studied montmorillonite is the dominant mineral of this fraction, as typified by the Robinsonville diagram. In some cases, such as the Forestdale, quartz and illite are present in greatest quantities. In general, montmorillonite, illite, quartz, and kaolinite are equally abundant. Vermiculite was found in all soils examined; in some cases it was a major component. Chlorite-vermiculite intergrade was found in a few samples but was not universally present as in the clay fractions. Chlorite and feldspar were found in small amounts in all samples. A significant variation in the mineralogy of the fine silt with depth and between profiles is of little quantitative significance since this fraction usually makes up less than 1 percent of the soil.

The coarse clay (2 to 0.2u) is uniform in mineralogy with depth and between profiles (Figure 14). Montmorillonite is estimated to make up over 50 percent of this fraction. Illite is also present in significant amounts, usually in the 15 to 30 percent range. The remaining minerals — kaolinite, quartz, and chlorite-vermiculite intergrade — are usually found in amounts of less than 10 percent. The relative amounts of these latter minerals vary with depth and between profiles, but the variation appears to be random. Vermiculite was found in only a few samples.

The medium and fine clay fractions (<0.2u) contained over 40 percent montmorillonite in all samples examined. This was followed in abundance by chlorite-vermiculite intergrade, illite, and kaolinite, in that order. The mineralogy of this fraction was very uniform both qualitatively and quantitatively with depth and between profiles (Figure 15). The fine clay differs from the coarse clay in having a greater amount of chlorite-vermiculite intergrade and no quartz.

In the Delta region as a whole, the remarkable thing is the uniformity of the mineralogy of the clay fraction. On this basis, it seems that a knowledge of the clay content of Delta soils would be sufficient to ascertain those soil properties dependent on mineralogy, without making a detailed mineralogical analysis. This is obvious in the case of the Alligator or Sharkey soils which may have up to 80 percent clay. The high shrink-swell potential of these soils is clearly related to the montmorillonite in the clay. The uniformly high illite content explains the generally high potassium-supplying power of Delta soils.

AMAGON SILT LOAM

Location: Woodruff County, Arkansas (5 mi. east and 1 1/4 mi. north of Augusta,
SW 1/4, NE 1/4, NE 1/4, Pedon No.: 1
Sec. 14, T8N, R3W, Photo. 1S-2H-113
Classification: Typic Ochraqualfs, fine-silty, mixed, thermic

Slope: Nearly level Drainage: Poorly drained

Samples collected by: G. R. Maxwell and J. E. Hollscher
On: April 24, 1962

Morphological description by: Marvin Lawson

Hor.	Depth	
A1	0-4"	Dark brown (10 YR 3/3) silt loam; weak medium granular structure; very friable; many pores and roots; common medium dark hard concretions; strongly acid; clear wavy boundary.
A2	4-9"	Mottled gray (10 YR 5/1-6/1) and light brownish gray (10YR 6/2) silt loam; weak coarse granular structure; very friable; many fine roots; many worm casts; many medium black hard concretions; strongly acid; clear wavy boundary.
B1g	9-25"	Gray (5Y 6/1) heavy loam with common medium distinct mottles of yellowish brown; weak medium subangular blocky structure; friable; common roots; many pores; few burrows or root channels; common medium black concretions; strongly acid; clear wavy boundary.
B2tg	25-40"	Gray (5Y 5/1) clay loam with common coarse distinct yellowish brown (10 YR 5/4) mottles; weak to moderate medium subangular blocky structure; firm; thin patchy clay films; common medium pores; common coarse black concretions; strongly acid; gradual wavy boundary.
B3g	40-58+"	Grayish brown (10YR 5/2) loam with about 10 percent light brownish gray and 5 percent yellowish brown medium distinct mottles; weak coarse subangular blocky structure; firm; few medium pores; few coarse light gray veins and pockets; few coarse soft dark concretions; strongly acid.

Remarks: Colors given are for moist soil.
pH was read by Hellige-Truog field kit.
Soil was moist throughout except at narrow zone between B_1 and B_2 which was saturated.

Table 6.

Soil Series Amagon Silt loam　　Location Woodruff Co. Ark.

Pedon No. 1　　Laboratory No. 246-250

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
A	0- 4	29.63	31.52	16.16	6.89	54.37			16.00	sil
A2	4- 9	30.50	29.28	18.18	6.03	53.50			16.00	sil
B1g	9-25	33.75	30.15	12.71	3.79	46.65			19.60	l
B2tg	25-40	36.90	25.32	6.93	2.55	36.90			28.30	cl
B3g	40-58	39.52	30.05	7.29	2.94	40.28			20.20	l

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P, lb/A.
A	2.89	5.5	4.4	7.07	3.59	1.01	1.52	0.32	0.63	91	52
A2	1.46	5.4	4.3	6.71	3.86	0.67	1.41	0.15	0.62	91	33
B1g	0.29	5.1	3.4	6.18	1.75	1.02	0.99	0.15	2.27	63	24
B2tg	0.29	4.9	3.2	12.60	1.02	3.12	1.78	0.27	5.87	49	7
B3g	0.06	5.0	3.1								13

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3*	2/3*	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
A		39.6	29.5	20.6	13.6		10.1	0.45	1.51	43
A2		31.6	24.2	17.4	11.4		8.5	0.34	1.47	45
B1g		27.3	18.5	14.8	11.6		7.6	0.29	1.45	45
B2tg		33.9	24.3	21.8	17.3		9.1	0.37	1.50	43
B3g		30.4	25.0	18.6	14.8		8.6	0.34	1.54	42

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
A	Q_1 I_3 PF_3 K_3 C_3	V_1 I_2 M_2 K_3 Q_3	M_1 $(I/M)_2$ K_3 AM_3	M_1 A_2
A2				
B1g	Q_1 I_3 PF_3 K_3 C_3	V_1 M_2 I_2 K_3 Q_3	M_1 $(I/M)_2$ K_3 Am_3	M_1 A_2
B2tg				
B3g	Q_1 I_3 PF_3 K_3 C_3	V_1 M_2 I_2 $(I/V)_3$	M_1 $(I/M)_2$ K_3 Am_3	M_1 A_2

* Values for non-disturbed cores; all other values are for disturbed samples.

ARKABUTLA SILT LOAM

Location: Crittenden Co., Arkansas, south side Hw 64, 1/2 mi. east of Cross-Crittenden County Line
Pedon No. 2

Classification: Aeric Fluvaquents,fine-silty, mixed, acid, thermic

Slope: Nearly level
Drainage: Somewhat poorly drained

Samples collected by: D. A. Brown & J. V. Pettiet
On: March 19, 1958

Morphological description by: James Gray & Marvin Lawson

Hor.	Depth	
Ap	0-8"	Grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; few fine concretions; many roots and pores; medium acid; abrupt smooth boundary.
A12	8-11"	Dark brown (10YR 3/3) silt loam with few fine faint dark yellowish brown mottles; weak medium subangular blocky structure; firm; few fine concretions; few roots and pores; strongly acid; abrupt wavy boundary.
B21	11-18"	Dark grayish brown (10YR 4/2) loam with many medium distinct yellowish brown mottles; weak medium subangular blocky structure; friable; few fine concretions; common roots and many pores; strongly acid; clear wavy boundary.
B22	18-27"	Grayish brown (10YR 5/2) loam with many medium distinct dark yellowish brown mottles; weak coarse subangular blocky structure; friable; few fine concretions; few roots and many pores; very strongly acid; abrupt wavy boundary.
B23	27-38"	Grayish brown (10YR 5/2) loam with many medium to coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few fine concretions; few roots and common pores; strongly acid, clear wavy boundary.
C	38-50+"	Grayish brown (10YR 5/2) sandy loam with many coarse distinct dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; friable; few fine concretions; few roots and common pores; strongly acid.

Table 7.

Soil Series Arkabutla Silt Loam Location Crittenden Co. Ark

Pedon No. 2 Laboratory No. 81-86

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap	0- 8	32.1				48.0	7.9	12.0	19.9	sil
A12	8-11	29.2				49.0	7.9	13.8	21.7	sil
B21	11-18	39.5				38.0	8.7	13.8	22.5	l
B22	18-27	42.5				38.4	7.7	11.4	19.1	l
B23	27-38	44.5				32.0	7.3	16.2	23.5	l
C	38-50	59.4				23.0	6.1	11.5	17.6	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P lb/A.
Ap	1.14	6.0	4.9	9.68	4.32	1.48	.27	.49	3.12	68	62
A12	0.89	5.2	4.1	11.50	3.80	1.24	.21	.29	5.96	48	48
B21	0.64	5.1	4.0	13.14	3.91	1.56	.33	.23	7.11	46	44
B22	0.51	4.9	3.9	12.38	3.50	1.64	.24	.13	6.87	45	35
B23	0.53	5.0	4.0	14.68	4.78	2.32	.29	.20	7.09	52	25
C	0.34	5.1	4.0	11.18	3.04	1.99	.33	.15	5.82	50	20

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15 *	Avail. Water In./In.	Bulk Density	Porosity %
Ap		13.6					5.6	0.13	1.57	47
A12		13.8					6.6	0.12	1.63	38
B21		15.5					7.3	0.17	1.45	45
B22		14.0					6.6	0.11	1.42	46
B23		18.3					8.5	0.15	1.56	47
C		11.8					5.9	0.09	1.50	43

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap		I2 O2 M3 K3	M1 I2 K3 V3	
A12		I1 M2 O3 K3	M1 I2 O3	
B21		I1 M2 O3 K3	M1 I3	
B22		I1 V2 M2 K3 O3	M1 I2 K3	
B23		I1 M3 V3 K3	M1 I1 K3	
C		I2 V2 M3 K3 O3	M1 I2 K3 V3	

* Values for disturbed cores.

BOSKET LOAMY FINE SAND

Location: Jackson County, Arkansas, 3 mi. south and 2.5 mi. east of Tuckerman, SW 1/4, SW 1/4. Sec. 11, T12N, R2W, Photo 1f-1N-161 Pedon No.: 3

Classification: Mollic Hapludalfs, fine-loamy, mixed thermic

Slope: 3 to 5% Drainage: Well drained

Samples collected by: D. A. Brown, M. E. Horn, & R. E. Phillips
On: November 16, 1961

Morphological description by: Marvin Lawson

Hor.	Depth	
Ap	0-6"	Dark brown (10YR 3/3) loamy fine sand; weak coarse granular structure, very friable; very strongly acid; abrupt wavy boundary.
B1	6-17"	Dark brown (7.5YR 3/2) heavy fine sandy loam; weak medium subangular blocky structure; sand grains coated and bridged with clay; friable; few roots; medium acid, gradual smooth boundary.
B2t	17-24"	Dark brown (7.5YR 4/4) light sandy clay loam; weak medium subangular blocky structure; friable; slightly plastic; thin patchy clay film, sand grains coated and bridged; fine roots; medium acid, clear wavy boundary.
C	24-48"	Dark brown (10YR 4/3) sandy loam with few medium faint mottles of pale brown; weak coarse subangular blocky structure; very friable; few medium black hard concretions; many black sand-size particles; slightly acid.

Table 8.

Soil Series Bosket, loamy fine sand   Location Jackson Co., Arkansas

Pedon No. 3   Laboratory No. 205-208

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 6	80.3	0.71	0.53	0.19	1.43			5.4	ls
B1	6-17	78.2				1.20			20.6	scl
B2t	17-24	72.7	4.01	1.45	0.80	6.26			21.0	scl
C	24-48	76.7	5.85	4.70	1.94	12.50			10.8	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.46	4.9	3.6	1.82	0.61	0.33	0.62	0.20	0.06	98	160
B1	0.46	5.7	4.2	2.91	1.71	0.33	0.86	0.15	-	105	47
B2t	0.13	5.8	4.4	10.03	1.91	0.08	0.46	0.10	6.80	25	46
C	0.39	6.1	4.8	3.41	3.41	0.33	0.70	0.15	-	135	70

Exchangeable Cations me/100g.: Ca, Mg, Na, K, H

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	22.0	7.1	6.1	4.7	3.1	3.0	1.7	0.08	1.53	42
B1	23.4	15.4	7.0	5.4	3.9	3.8	2.5	0.19	1.49	44
B2t	26.6	7.2	6.1	5.8	4.0	3.8	2.5	0.06	1.38	48
C	-	10.2	6.9	5.9	4.8	3.7	3.5	0.11	1.58	40

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap	I_1 O_2 KF_3 PF_3 C_3	I_1 K_3 $(I/V)_3$ O_3	M_2 K_2 I_2 V_3 O_3	M_1 A_2
B1	I_1 O_2 KF_3 PF_3 V_3	I_1 K_3 $(I/V)_3$ O_3	M_1 I_2 K_3 V_3 O_3	M_1 A_2
B2t	I_2 PF_3 KF_3 V_3 O_3	I_2 M_2 K_2 V_3	M_1 I_2 K_3 V_3 O_3	M_1 A_2
C	I_2 PF_3 KF_3 V_3 O_3	I_2 M_2 K_2 V_3	M_1 I_2 K_3 V_3 O_3	M_1 A_2

* Values for non-disturbed cores; all other values are for disturbed samples.

DUBBS SILT LOAM

Location: Phillips County, Arkansas, Ben Laney Hqts., 900 ft. SW of Highland lake store, north side of Hw 44

Pedon no.: 4

Classification: Typic Hapludalfs, fine-silty, mixed, thermic

Slope: Nearly level, slope 1-2%

Drainage: Moderately well and well drained

Samples collected by: D. A. Brown & J. V. Pettiet

On: March 18, 1958

Morphological description by: James Gray & Marvin Lawson

Hor.	Depth	
Ap	0-5"	Dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many roots and pores; medium acid; abrupt smooth boundary.
B2t	5-17"	Brown (10YR 5/3) heavy silt loam; weak to moderate medium to coarse subangular blocky structure; friable; few silt pockets; patchy thin clay films; many roots and pores; strongly acid; clear wavy boundary.
B31	17-30"	Dark yellowish brown (10YR 4/4) silt loam with few medium distinct light brownish gray silt pockets; weak coarse subangular blocky structure; friable; common roots and pores; patchy thin clay films; strongly acid; diffuse boundary.
B32	30-42"	Brown (10YR 5/3) silt loam with many coarse distinct light brownish gray (10YR 6/2M) mottles; weak coarse subangular blocky structure; friable; few roots and many pores; strongly acid; diffuse boundary.
B33	42-50+"	Brown (10YR 5/3) silt loam with many coarse faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine concretions; few roots and common pores; strongly acid.

Table 9.

Soil Series Dubbs silt loam — Location Phillips Co. Ark.

Pedon No. 4 — Laboratory No. 62-66

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 5	84.2	5.01	6.28	1.71	13.0			2.8	ls
B2t	5-17	78.9	2.30	2.45	3.14	7.9			13.2	sl
B31	17-30	68.0	2.06	3.57	0.57	6.2			25.8	scl
B32	30-42	72.9	6.47	1.60	2.73	1.08			16.3	sl
B33	42-50+	84.9	5.84	1.14	0.81	7.8			7.3	ls

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.65	6.0	4.5	3.62	1.51	0.66	0.61	0.41	0.43	88	64
B2t	0.27	5.9	4.3	8.03	3.03	1.00	0.79	0.31	2.90	64	48
B31	0.59	5.1	3.5	10.34	4.12	2.03	1.25	0.42	0.52	76	36
B32	0.27	5.1	4.5	8.19	2.85	1.83	0.97	0.20	2.34	71	31
B33	0.00	5.0	4.3	5.87	2.72	1.33	1.05	0.16	0.61	90	23

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0*	1/3*	2/3*	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	26.5	8.8	7.4	3.9	2.9	2.4	1.7	0.11	1.50	43
B2t	24.6	11.2	9.4	7.4	6.1	5.0	4.3	0.11	1.59	40
B31	27.7	20.2	18.6	13.6	11.4	10.2	8.6	0.18	1.55	42
B32	-	11.9	-	8.8	7.7	6.7	5.8	0.09	1.53	42
B33	-	7.2	-	5.1	4.0	3.5	2.7	0.07	1.51	43

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap	O_1 PF_3 KP_3 K_3 I_3	V_2 I_2 M_3 O_3	M_1 I_2 K_3 O_3	M_1 A_2
B2t	O_1 PF_3 KP_3 K_3 I_3	V_2 I_2 M_3 O_3	M_1 I_2 K_3 O_3	M_1 A_2
B31	O_1 PF_3 KP_3 I_3	V_2 I_2 M_3 O_3	M_1 I_2 K_3 O_3	M_1 A_2
B32	O_1 PF_3 KP_3 I_3	V_2 M_2 I_3 O_3	M_1 I_2 K_3 O_3	M_1 A_2
B33	O_1 PF_3 KP_3 I_3	V_2 M_2 I_3 O_3	M_1 I_2 K_3 O_3	M_1 A_2

* Values for non-disturbed cores; all other values are for disturbed samples.

FOLEY SILT LOAM

Location: Phillips County, Ark., NE NE, Sec. 3, T 3 S, R 1 E, 50 ft west of local road, 1/8 mi south of Ark. Hw 1, 2 mi east of Turner

Pedon No.: 5

Classification: Albic Glossic Natraqualfs, fine-silty, mixed, thermic

Slope: Nearly level

Drainage: Poorly drained

Samples collected by: H. C. Dean, G. R. Maxwell, & J. L. Gray

On: May 17, 1961

Morphological description by: Marvin Lawson

Hor.	Depth	
Ap1	0-3"	Very dark grayish brown (10YR 3/2) silt loam; weak medium granular structure; very friable; numerous vesicles; numerous fine roots; pH 6.5; obscure boundary.
Ap2	3-8"	Gray (10YR 7/1) silt loam with few fine yellowish brown mottles; massive, compact; common roots; pH 6.0; clear wavy boundary.
A2g	8-12"	Gray (10YR 5/1) silt loam with few medium yellowish brown mottles; weak medium platy structure; very friable; common roots, numerous vesicles; pH 5.5; clear wavy boundary.
B21tg	12-19"	Gray (10YR 5/1) silt loam with common coarse mottles of yellowish brown; moderate medium prismatic breaking to weak medium subangular blocky structure; peds coated with silt; common roots; common vesicles; peds have subrounded tops coated with white silt; pH 5.0; gradual wavy boundary.
B22tg	19-24"	Grayish brown (2.5Y 5/2) heavy silt loam with few medium mottles of light brownish gray and yellowish brown; moderate medium prismatic breaking to coarse irregular blocky structure; very firm; peds silt-coated; common pores and vesicles; few pockets of silty clay; pH 5.5; diffuse boundary.
B23tg	24-29"	Gray (10YR 5/1) heavy silt loam with common medium yellowish brown mottles; moderate medium prismatic breaking to weak medium subangular blocky structure; moderately friable; pH 5.5; clear wavy boundary.
B24tg	29-35"	Grayish brown (2.5Y 5/2) light silty clay loam with few fine yellowish brown and very dark brown mottles; moderate medium prismatic breaking to moderate medium irregular blocky; firm; few fine hard concretions; peds coated with white silt; pH 7.0; gradual wavy boundary.
B25tg	35-59+"	Gray (5Y 5/1) light silty clay loam with common medium yellowish brown mottles and few black mottles; no structure on auger borings; few crevices filled with white silt; pH 8.5.

Table 10.

Soil Series Foley silt loam   Location Phillips Co., Ark.

Pedon No. 5   Laboratory No. 1968-1981

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap1	0- 3	2.0	0.30	0.32	1.43	85.3			12.7	si-sil
Ap2	3- 8	2.4	0.33	0.15	1.88	82.4			15.2	sil
A2g	8-12	1.1	0.16	0.13	0.78	86.2			12.7	si-sil
B21tg	12-19	0.7	0.11	0.03	0.46	72.0			27.3	sil,sicl
B22tg	19-24	0.3	0.08	0.05	0.18	69.3			30.4	sicl
B23tg	24-29	0.8	0.13	0.13	0.51	69.9			30.4	sicl
B24tg	29-39	0.9	0.13	0.18	0.63	67.6			31.5	sicl
B25tg	39-59	1.6	0.36	0.26	1.09	66.1			32.3	sicl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap1	0.70	5.7	4.5	11.50	2.25	2.08	0.11	0.34	6.72	41.57	66
Ap2	0.90	5.6	4.3	14.29	2.00	2.08	0.38	0.15	9.68	32.26	43
A2g	0.94	5.4	4.2	11.86	0.75	3.13	0.37	0.07	7.54	36.42	25
B21tg	0.97	5.2	4.1	20.01	0.69	6.25	1.44	0.12	11.51	42.28	45
B22tg	0.80	5.0	4.7	21.99	0.94	8.33	3.37	0.18	9.17	58.30	57
B23tg	0.46	5.0	4.3	20.83	1.06	9.38	4.89	0.20	5.30	74.56	91
B24tg	0.30	7.9	6.2	26.63	1.18	14.58	7.61	0.18	2.95	88.92	115
B25tg	0.06	7.9	6.2	32.50	0.84	17.01	7.50	0.29	3.32	89.67	290

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Density	Porosity %
Ap1	39.5						12.2		1.35	49
Ap2	38.2						14.0		1.47	44
A2g	32.0						16.0		1.55	41
B21tg	36.9						21.0		1.51	43
B22tg	39.5						13.5		1.48	44
B23tg	42.1						15.2		1.47	45
B24tg	38.3						16.1		1.49	44
B25tg	46.9						28.6		1.59	40

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap1	Q1 I3 PF3 K3 V3 C3	I2 K3 (I/V)3 M3 Q3	M1 K3 I3 Am3	M1 A3
Ap2	-	-	-	-
A2g	I2 Q2 PF3 K3 V3 KF3	-	-	-
B21tg	-	M1 I2 K2 Q3	M1 I2 K3 Am3	M1 A3
B22tg	Q1 PF3 KF3 V3 I3	M1 I2 K2 Q3	M1 I2 K3 Am3	M1 A3
B23tg	-	-	-	-
B24tg	Q1 PF3 KF3 V3 I3	M1 I2 K3 V3	M1 I2 K3 Am3	M1 A3
B25tg				

* Values for distubed cores.

ROSEBLOOM SILTY CLAY LOAM

Location: Crittenden Co., Arkansas, 1 1/2 mi. E of Cross-Crittenden County lines, South side of Hw 64

Pedon No.: 6

Classification: Typic Fluvaquent, fine-silty, mixed, acid, thermic

Slope: Nearly level

Drainage: Poorly drained

Samples collected by: D. A. Brown & J. V. Pettiet

On: March 19, 1958

Morphological description by: James Gray

Hor.	Depth	
Ap1	0-5"	Dark grayish brown (10YR 4/2) silty clay loam; weak fine granular structure; friable; few fine dark concretions; many roots and few pores; strongly acid; abrupt smooth boundary.
Ap2	5-7"	Gray (10YR 5/1) silty clay loam with few medium distinct yellowish brown mottles; weak medium subangular blocky structure; firm, common dark concretions; common roots and few pores; strongly acid; abrupt wavy boundary.
B21g	7-14"	Gray (10YR 5/1) silty clay loam with many medium distinct brown and few medium distinct yellowish brown mottles; weak medium subangular blocky structure; friable; many fine dark concretions; few roots and pores; strongly acid; clear wavy boundary.
B22g	14-32"	Gray (10YR 6/1) clay loam with many coarse distinct brown and few medium distinct yellowish brown mottles; weak medium to coarse subangular blocky structure; friable; few fine concretions; few roots and common pores; strongly acid; diffuse boundary.
B3g	32-50+"	Gray (10YR 6/1) clay loam with many coarse faint dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; friable; common fine concretions; few roots and common pores; strongly acid.

Table 11.

Soil Series Rosebloom silty clay loam Location Crittenden Co. Ark

Pedon No. 6 Laboratory No. 87-90

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap1	0- 5	15.1				46.1	12.9	25.9	38.8	sicl
Ap2	5- 7	15.6				45.6	14.0	24.8	38.8	sicl
B21g	7-14	19.8				47.5	11.1	21.6	32.7	sicl
B22g	14-32	22.4				49.5	9.7	18.4	28.1	cl
B3g	32-50+									

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P lb/A.
Ap1	1.69	5.5	4.3	16.54	5.48	3.06	.26	.72	7.02	58	68
Ap2	1.46	5.6	4.9	20.02	6.17	3.03	.22	.44	10.16	49	54
B21g	0.70	5.2	4.1	17.06	5.65	3.10	.30	.20	7.81	54	32
B22g	0.56	5.1	4.0	15.21	5.35	2.73	.27	.22	6.64	56	41
B3g											

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15 *	Avail. Water In./In.	Bulk Density	Porosity %
Ap1		22.8					12.4	0.16	1.56	41
Ap2		23.3					11.1	0.20	1.65	38
B21g		20.2					9.9	0.16	1.55	42
B22g		19.0					9.2	0.14	1.44	46
B 3g										

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap1	Q1 I3 PF3 KF3 V3 C3	I1 Q3 C13 M3	M1 I2 V3	M1 A2
Ap2	Q1 I3 PF3 KF3 V3 C3	I1 M3 K3 Q3	M1 I2 K3	M1 A2
B21g	Q1 I3 PF3 KF3 V3 C3	I1 Q3 M3 C13 K3	M1 I2 Q3	M1 A2
B22g	Q1 F3 PF3 KF3 V3 C3	I2 V2 K3 Q3 M3	M1 I2	M1 A2
B3g				

* Values for disturbed cores.

FORESTDALE LOAM

Location: Coahoma Co., Mississippi, T25N, R3W, Sec. 22 NE 1/4, SE 1/4, Sheet 57, Coahoma County Soil Survey

Pedon No.: 17

Classification: Typic Ochraqualfs, fine, montmorillonitic, thermic

Slope: Nearly level

Drainage: Poorly drained

Samples collected by: D. A. Brown, R. E. Phillips, & M. E. Horn

On: April 8, 1962

Morphological description by: M. E. Horn & H. B. Vanderford

Hor.	Depth	
Ap	0-7"	Dark grayish brown (10YR 4/2) heavy loam with few fine distinct mottles of gray; moderate medium granular structure; friable,sticky, plastic; many fine pores and roots; few fine soft black concretions; strongly acid; abrupt smooth boundary.
B21tg	7-25"	Gray (10YR 5/1) clay with common medium to distinct mottles of strong brown; massive to weak subangular coarse blocky; firm, very sticky, very plastic; few very fine and fine pores and roots; clay films on peds; strongly acid; gradual wavy boundary.
B22tg	25-38"	Gray (10YR 5/1) clay with many medium and coarse distinct mottles of strong brown; massive to weak subangular blocky; very stick, very plastic, firm; few fine pores; thin clay films on peds and in larger root channels; medium acid; clear smooth boundary.
B3g	38-58+"	Mottled gray (10YR 5/1) and strong brown fine sandy loam; massive to weak medium subangular blocky structure; friable; few fine pores; thick continuous clay films on walls of channels; also soft white limey concretions in channels; hard gray irregular shaped limey concretions up to 1 1/2 inches in diameter which increase in size and abundance with depth.

Table 12

Soil Series Forestdale, Loam — Location Coahoma Co., Miss.

Pedon No. 17 — Laboratory No. 224-227

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20µ	% Silt M 20-5µ	% Silt F 5-2µ	% Silt Total	% Clay 2-0.2µ	% Clay 0.2µ	% Clay Total	Text. Class
Ap	0 -7	33.6	7.9	22.4	6.7	37.0	12.4	13.2	25.6	l
B21tg	7-25	11.8	4.3	18.5	6.0	28.8	21.8	33.9	55.7	c
B22tg	25-38	29.3	6.6	11.2	4.3	22.1	17.0	27.0	44.0	c
B3g	38-58+	56.0	17.4	6.6	1.0	25.0	8.7	9.1	17.8	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Ca	Mg	Na	K	H	% Base Satn.	P, lb/A.
Ap	1.98	5.4	3.4	16.0	4.2	4.2	.30	.41	11.9	57	62
B21tg	0.75	5.1	3.2	37.5	8.6	6.4	3.12	.57	24.5	50	44
B22tg	0.67	5.9	3.6	30.5	9.1	12.7	2.29	.45	7.0	80	14
B3g	0.48	5.5	3.7	15.0	8.0	2.2	.28	.39	6.1	73	90

Exchangeable Cations (Ca, Mg, Na, K, H) in me/100g.

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	36.9	27.0	25.7	25.9	18.1	16.0	11.2	0.21	1.31	51
B21tg	39.0	36.2	34.6	34.2	30.5	27.7	22.9	0.18	1.34	49
B22tg	29.8	27.4	26.9	27.8	26.2	22.7	18.1	0.14	1.51	43
B3g	27.1	23.9	23.2	21.8	10.0	8.1	7.4	0.27	1.65	38

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2µ	Clay Fraction 2.0-0.2µ (Coarse)	Clay Fraction 0.2-0.08µ (Medium)	Clay Fraction <0.08µ (Fine)
Ap	Q2 I2 K3 M3 F3 V3	M1 I2 K2 Q3	M1 C/V2 I3 K3	
B21tg	Q2 I2 K3 V3 M3 F3 C3	M1 I2 K2 Q3 C/V3	M1 C/V2 I3 K3	
B22tg	Q2 I2 K3 V3 M3 F3 C3	M1 I2 K3 Q3 C/V3	M1 C/V2 I3 K3	
B3g	I2 Q2 M3 V3 K3 F3 C3	M1 I2 K2 Q3 C/V3	M1 C/V2 I3 K3	

* Values for non-disturbed cores; all other values are for disturbed samples.

ROBINSONVILLE FINE SANDY LOAM

Location: Washington Co., Miss., on Stoneville Experiment Station, NW 1/4, SE 1/4, NE 1/4, Sec. 15, T18N, R7W, Sheet 13, Washington Co. Soil Survey

Pedon No.: 18

Classification: Typic Udifluvents, coarse-loamy, mixed, non-acid thermic

Slope: Nearly level

Drainage: Well drained

Samples collected by: V. E. Nash, D. A. Brown, & R. E. Phillips

On: May 14, 1962

Morphological description by: M. E. Horn

Hor.	Depth	
Ap	0-7"	Brown (10YR 4/3) fine sandy loam, weak medium granular structure; very friable; few micro- and very fine pores; medium acid; clear smooth boundary.
A12	7-13"	Brown (10YR 4/3) fine sandy loam; structureless; friable; common micro- and fine pores; medium acid; diffuse wavy boundary.
C1	13-23"	Brown (10YR 5/3) to light yellowish brown sandy loam; loose; structureless; has thin bedding planes, thin laminae of dark brown fine sandy loam; neutral; clear smooth boundary.
C2	23-29"	Dark grayish brown (10YR 4/2) loamy sand with common fine and medium faint mottles of grayish brown and few fine faint mottles of yellowish brown; structureless; has bedding planes; friable; neutral; clear smooth boundary.
C3	29-43+"	Brown (10YR 5/3) fine sandy loam with common medium faint mottles of light grayish brown and few medium faint mottles of yellowish brown; structureless; friable; neutral.

Table 13.

Soil Series: Robinsonville, fine sandy loam   Location: Washington Co. Miss.

Pedon No. 18   Laboratory No. 228-232

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 7	66.0	15.3	7.0	0.8	23.1	3.4	5.4	8.8	sl
A12	7-13	71.2	10.2	6.4	1.4	18.0	3.2	4.8	8.0	sl
C1	13-23	74.2	10.6	5.6	0.6	16.8	3.0	3.6	6.6	sl
C2	23-29	78.9	10.2	3.2	1.2	14.6	1.8	2.2	4.0	sl
C3	29-43+	72.7	15.3	4.8	0.8	20.6	2.4	3.2	5.6	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exch. Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P, lb/A.
Ap	0.93	5.4	3.9	10.5	4.8	2.3	.08	.53	3.4	73	90
A12	0.67	5.8	4.1	11.0	5.0	2.3	.11	.47	3.3	72	82
C1	0.13	6.7	4.8	9.5	5.4	2.2	.09	.31	2.3	84	58
C2	0.74	6.6	4.8	7.3	4.6	1.9	.05	.21	1.6	93	43
C3	0.07	6.9	5.5	8.3	5.2	1.8	.07	.21	1.3	88	29

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	34.0	16.0	11.7	9.5	7.0	-	4.2	0.17	1.40	48
A12	30.0	15.3	12.5	7.0	5.9	-	3.7	0.17	1.50	43
C1	34.5	17.9	14.1	5.2	4.4	3.8	3.3	0.21	1.39	48
C2	29.3	8.8	6.9	-	3.2	2.3	2.3	0.09	1.31	51
C3	35.9	15.8	11.8	5.2	3.8	3.6	2.9	0.18	1.37	49

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap	M2 I2 Q2 K3 V3 C3 C/V3 F3	M1 I2 K3 Q3 C/V3 V3	M1 C/V2 I3 K3	
A12	M2 I2 Q2 K3 V3 C3 C/V3 F3	M1 I2 K3 Q3 C/V3 V3	M1 C/V2 I3 K3	
C1	M2 I2 Q2 K3 V3 C3 C/V3 F3	M1 I2 K3 Q3 C/V3 V3	M1 C/V2 I3 K3	
C2	M2 I2 Q2 K3 V3 C3 C/V3 F3	M1 I2 K3 Q3 C/V3 V3	M1 C/V2 I3 K3	
C3	M2 I2 Q2 K3 V3 C3 C/V3 F3	M1 I2 K3 Q3 C/V3 V3	Mi C/V2 I3 K3	

* Values for non-disturbed cores; all other values are for disturbed samples.

TUTWILER FINE SANDY LOAM

Location: Coahoma Co., Miss., near Mattson, T26N, R3W, Sec. 21, SW 1/4, SE 1/4, Sheet 51 of Coahoma Co. Soil Survey

Pedon No.: 19

Classification: Typic Hapludalfs, coarse-silty, mixed, thermic

Slope: Nearly level | Drainage: Well drained

Samples collected by: D. A. Brown, R. E. Phillips, & M. E. Horn
On: April 8, 1962

Morphological description by: M. E. Horn & H. B. Vanderford

Hor.	Depth	
Ap	0-6"	Brown (10YR 4/3) very fine sandy loam; weak fine and medium granular structure; very friable; many fine pores; many fine and very fine roots; slightly acid; abrupt smooth boundary.
B2t	6-22"	Brown (10YR 4/3) very fine sandy loam; weak medium subangular blocky structure; friable; many fine pores and roots; very thin patchy clay films on sides of peds in the upper part; medium acid; clear smooth boundary.
IIC1	22-34"	Yellowish brown (10YR 5/4) fine sand; structureless; single grain; loose to very friable; few very fine roots; medium acid; clear smooth boundary.
IIC2	34-46+"	Stratified layers of dark brown (10 YR 4/3) loam and yellowish brown (10YR 5/4) fine sand; layers of dark brown material range in thickness from 1/2 to 4 inches; structureless; single grain; loose to friable; medium acid.

Remarks: A separate bulk sample (#212) was taken from the dark brown material in the C_2 horizon; bulk and core samples were taken from the yellowish brown material in the C_2 horizon and from all other horizons. Colors are for moist soil.
A few small channels (1/2 to 1 inch diameter) filled with B_2 material extend into the C_1 horizon.
Frank Scott assisted in locating the sample site.

Table 14.

Soil Series Tutwiler fine sandy loam Location Coahoma Co. Miss.

Pedon No. 19 Laboratory No. 209-213

PHYSICAL DATA Analyst:

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap	0- 6	51.2	27.0	13.8	0.4	41.2	3.9	1.2	5.1	sl
B2t	6-22	53.1	23.6	7.3	1.2	32.1	11.0	2.5	13.5	sl
IIC1	22-34	95.2	1.9	1.4	0.4	3.7	0.2	0.3	0.5	s
IIC(1)	34-46	86.6	2.7	1.2	0.4	4.3	7.2	0.2	7.4	ls
C2(2)	46+	94.9	1.5	2.7	0.6	4.8	0.2	0.3	0.5	s

CHEMICAL DATA Analyst:

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.98	6.38	4.5	7.0	3.9	0.5	.03	.45	2.5	70	76
B2t	0.73	5.51	3.7	14.0	8.0	1.2	.07	.23	5.6	68	94
IIC1	0.27	5.68	3.8	6.0	3.0	0.5	.06	.09	2.3	62	60
IIC2(1)	0.40	5.87	4.0	10.0	5.0	1.8	.08	.21	3.6	71	94
IIC2(2)	0.13	5.89	4.0	6.5	4.0	0.6	.08	.13	1.8	74	50

MOISTURE AND BULK DENSITY DATA Analyst:

Horizon	% Water retained at specified tension(Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	35.7	17.0	14.0	6.1	4.3	3.5	2.5	0.19	1.32	50
B2t	33.9	18.4	15.9	12.1	8.7	7.7	6.4	0.17	1.40	47
IIC1	33.9	5.3	4.5	3.1	2.5	2.0	1.9	0.05	1.37	48
IIC(1)	-	-	-	7.0	5.7	5.0	4.2	-	-	-
C2(2)	-	-	-	3.6	3.0	2.5	2.3	-	-	-

MINERALOGICAL DATA Analyst:

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap	M2 Q2 I2 K2 C3 V3 F3	M1 I2 K3 O3 C/V3	M1 C/V2 I3 K3	
B2t	M2 Q2 I2 K2 C3 V3 F3	M1 I2 K3 O3 C/V3	M1 C/V2 I3 K3	
IIC1	M2 Q2 I2 K2 C3 V3 F3	M1 I2 K3 O3 C/V3	M1 C/V2 I3 K3	
IIC(1)	M2 Q2 I2 K2 C3 V3 F3	M1 I2 K3 O3 C/V3	M1 C/V2 I3 K3	
C2(2)	M2 Q2 I2 K2 C3 V3 F3	M1 I2 K3 O3 C/V3	M1 C/V2 I3 K3	

*** Values for non-disturbed cores; all other values are for disturbed samples.**

Location: Tensas Parish, La., 50 ft north of Hw 566, 6 mi west of Waterproof; SW 1/4, NE 1/4, Sec. 31, T 10 N, R 10 E.

Pedon no.: 25

Classification: Vertic Haplaquepts, very fine, montmorillonitic, acid, thermic

Slope: Level (less than 1/2 percent) Drainage: Poorly drained

Samples collected by: D. F. Slusher, A. G. Caldwell, and J. Seaholm

On: April 15, 1964

Morphological description by: Tracey A. Weems and D. F. Slusher

Hor.	Depth	
A11	0-1"	Very dark gray (10YR 3/1) silty clay loam; weak fine granular structure; firm; many fine roots; few partially decayed leaves; neutral (pH 7.0); gradual smooth boundary.
A12	1-6"	Gray (10YR 5/1) clay; common fine faint dark yellowish brown (10YR 4/4) mottles and a few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; many fine roots; few very fine pores in peds; very strongly acid (pH 5.0); gradual smooth boundary.
B21g	6-13"	Gray (10YR 5/1) on ped surfaces; clay; grayish brown (10YR 5/2) with common fine faint dark yellowish brown (10YR 4/4) and few yellowish brown (10YR 5/6) mottles inside peds; strong medium and fine angular blocky structure; firm; many fine roots; few pores in peds; very strongly acid (pH 5.0); clear smooth boundary.
B22g	13-20"	Gray (10YR 5/1) clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; strongly acid (pH 5.5); gradual smooth boundary.
B23g	20-30"	Gray (10YR 5/1) clay; common fine faint dark yellowish brown (10YR 4/4) mottles and a few yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; very firm; few small slicken sides 1 to 2 1/2 inches in diameter; few fine dark concretions; few fine roots; strongly acid (pH 5.5); gradual smooth boundary.
B3g	30-42"	Gray (10YR 5/1) clay; many fine faint dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; very firm; prominent 3 to 6 inch slicken sides on 45 degree angle; very few roots; few fine dark concretions; medium acid (pH 6.0); gradual smooth boundary.
C1g	42-54"	Gray (10YR 5/1) clay; common fine faint dark yellowish brown (10YR 4/4) mottles and few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; very firm; few slicken sides 3 to 6 inches in diameter on about 30 degree angle; few dark concretions; very few roots; neutral (pH 7.0); gradual smooth boundary.
C2g	54-60"	Gray (10YR 5/1) clay; common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; few fine concretions; soil calcareous; moderately alkaline (pH 8.0).

Remarks: A dark grayish brown (10YR 4/2) light silty clay loam strata, 1/2 to 1 inch thick, not described with 10 to 18" B_2 horizon.

0 to 7", 18 to 24" horizons sampled for LHD and 18 to 24" sampled for BPR.
Munsell colors for moist soil unless otherwise stated.
Reaction by Hellige-Truog field kit.
Soil moist to 34 inches, dry 34 to 60 inches.
Few fine pieces of charcoal in horizons C3 and C4.

A few balls and 1 inch strata of dark brown (7.5YR 4/4) light silty clay loam in the lower part of horizon C2.

Table 15.

Soil Series Alligator Clay Location Tensas Pa. La.

Pedon No. 25 Laboratory No. S64-LA-54-6(1-8)

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
A12	1- 6	3.0				34.3			62.7	c
B21g	6-13	1.4				33.3			65.3	c
B22g	13-20	2.2				36.0			61.8	c
B23g	20-30	3.0				42.5			54.5	sic
B3g	30-42	0.4				32.2			67.4	c
C1g	42-54	-				31.8			68.2	c
C2g	54-60									

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.	P_2 lb/A.
A12	3.55	4.8	3.7	40.1	19.7	7.5	0.3	0.9	17.8	61	40	110
B21g	2.16	4.8	3.6	41.4	21.3	8.2	0.4	0.7	19.8	61	32	90
B22g	1.50	5.0	3.7	40.1	19.8	7.8	0.6	0.7	16.2	64	30	100
B23g	.91	5.2	3.8	37.3	19.6	8.1	0.9	0.6	13.8	68	44	140
B3g	.90	5.2	4.0	43.4	25.6	11.5	1.4	0.9	13.2	75	24	90
C1g	.76	6.6	5.5	44.7	28.2	12.2	1.9	0.9	8.7	83	20	100
C2g												

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Density	Porosity %
A12		-				-	26.6	-	-	-
B21g		-					26.4	-	-	-
B22g		36.4					25.3	0.13	1.20	55
B23g		33.7					22.5	0.15	1.32	50
B3g		39.2					27.7	0.14	1.26	52
C1g		37.6					26.3	0.15	1.36	49
C2g										

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction < 0.2-0μ (Fine)	
A12		M1 I2 K2 Q3	M1 K3 I3	
B21g		-	-	
B22g		M2 I2 K3 Q3	M1 I3 K3	
B23g		-	-	
B3g		-	-	
C1g		M1 I2 K2 Q3	M1	
C2g				

* Values for disturbed samples.

BRUIN SILT LOAM

Location: Tensas Parish, La., 2 1/2 mi southeast of intersection of Hw 4 and 605 in Newellton, 1200 ft southwest of Hw 605; 2500 ft northwest of intersection of Hw 605 and 608; 200 ft east of fieldroad;
Sec. 17, T 12 N, R 12 E. Pedon No.: 26

Classification: Fluvaquentic Eutrochrepts, coarse-silty, mixed, thermic

Slope: 1/2 percent Drainage: Moderately well drained

Samples collected by: D. F. Slusher and A. G. Caldwell
On: February 6, 1964

Morphological Description by: Tracey A. Weems and S. A. Lytle

Hor.	Depth	
Ap	0 to 7"	Dark grayish brown (10YR 4/2) gritty silt loam; weak very fine granular structure in upper 5 inches; weak coarse platy structure 5 to 7 inches; friable; many fine roots; neutral (pH 6.8); gradual smooth boundary.
A12	7-10"	Dark grayish brown (10YR 4/2) gritty silt loam with thin lenses of loam; weak coarse subangular blocky structure; friable; many fine roots; slight acid (pH 6.5); gradual smooth boundary.
B2	10-18"	Dark brown (10YR 4/3) gritty silt loam; common fine faint dark grayish brown (10YR 4/2) and few fine faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine pores in peds; many fine roots; slightly acid (pH 6.5); abrupt smooth boundary.
B3	18-24"	Dark brown (10YR 4/3) gritty silt loam; common fine faint dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2); and few fine faint yellowish brown (10YR 5/4) mottles in lower part of the horizon; weak medium subangular blocky structure; friable; many fine pores in peds; few fine roots; slightly acid (pH 6.5); gradual smooth boundary.
C1	24-34"	Brown (10YR 5/3) gritty silt loam; common fine faint grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) mottles; very fine weak platy structure in upper part of the horizon and weak coarse platy structure in the lower part; friable; few fine pores in the peds; few fine roots; slightly acid (pH 6.5); abrupt smooth boundary.
C2	34-46"	Brown (10YR 5/3) very fine sandy loam; common fine faint light brownish gray (10YR 6/2); dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) mottles; weak very fine platy structure; friable; many fine pores in peds; few fine roots; mildly alkaline (pH 7.5); abrupt smooth boundary.
C3	46-54"	Dark gray (10YR 4/1) silty clay; common fine faint yellowish brown (10YR 5/6) and few fine faint dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; moderately alkaline (pH 8.0); gradual smooth boundary.
C4	54-60"	Grayish brown (10YR 5/2) very fine sandy loam; common fine faint dark yellowish brown (10YR 4/4) and few very faint gray (10YR 5/1) mottles; few root channels filled with (10YR 4/1) silty clay loam; weak subangular blocky structure; friable; very few roots; moderately alkaline (pH 8.0).

Remarks: Soil was wet to 20 inches, slightly moist below.
Reaction by Hellige-Truog field kit.
Munsell colors for moist soil unless otherwise stated.
Horizon C3,46-54" was between dark gray (10YR 5/1) and dark gray (10YR 4/1) in color.

Table 16.

Soil Series Bruin silt loam   Location Tensas Pa. La.

Pedon No. 26   Laboratory No. S64-LA-54-2(1-6)

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 7	25.4				63.4			11.2	sil
A12	7-10	20.0				60.2			19.8	sil
B2	10-18	19.1				62.5			18.4	sil
B3	18-24	33.6				56.5			9.9	sil
C1	24-34	40.1				51.0			8.9	sil
C2	34-46	33.0				58.1			8.9	sil

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.	P_2 lb/A.
Ap	1.02	5.4	4.4	9.8	6.8	1.8	0.2	0.4	4.0	70	50	490
A12	.60	6.2	4.8	15.4	10.2	2.9	0.2	0.3	4.3	76	38	430
B2	.50	6.2	4.8	14.8	10.9	3.0	0.2	0.3	4.1	78	34	450
B3	.24	6.3	4.8	9.6	7.1	2.0	0.2	0.2	2.6	78	30	610
C1	.17	6.5	5.0	8.8	6.5	2.3	0.2	0.2	2.2	81	28	590
C2	.17	7.4	5.9	8.8	5.7	2.7	0.2	0.2	1.6	84	18	670

Exchangeable Cations me/100g.: Ca, Mg, Na, K, H

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Density	Porosity %
Ap		27.8					8.8	0.27	1.45	45
A12		29.3					10.2	0.28	1.45	45
B2		29.5					9.9	0.27	1.37	48
B3		29.4					5.7	0.33	1.39	48
C1		27.7					5.1	0.32	1.42	47
C2		29.8					5.5	0.34	1.41	

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction < 0.2-0μ (Fine)
Ap		M2 I2 K3 Q3	M1 I3 K3
A12		-	-
B2		M1 I2 K2 Q3	M1 I3 K3
B3		-	-
C1		-	-
C2		M1 I3 K3 Q3	M1 I3 K3

* Values for disturbed samples.

COMMERCE SILT LOAM

Location: Tensas Parish, La., on Northeast La. Agricultural Experiment Station, 1050 ft east of old Hw 65, 1200 ft northeast of Station office, NE 1/4, NW 1/4, Sec. 35, T11N, R12E (Photo CTO-2BB-145)

Pedon No.: 27

Classification: Aeric Fluvaquents, fine-silty, mixed non-acid, thermic

Slope: 1/2 percent convex to the west

Drainage: Somewhat poorly drained, runoff slow

Samples collected by: James DeMent, D. A. Brown, J. L. Walker, & R. E. Phillips

Morphological description by: David F. Slusher and Tracey Weems

Hor.	Depth	
Ap1	0-6"	Dark grayish brown (10YR 4/2, 6/2 dry) silt loam; weak very fine granular, friable; few roots; slightly acid (pH 6.5); abrupt smooth boundary.
Ap2	6-10"	Dark grayish brown (10YR 4/2, 6/2 dry) silt loam; massive to weak coarse platy; firm, hard; common fine soft dark brown; few roots; medium acid (pH 5.7); abrupt smooth boundary.
B2	10-19"	Very dark grayish brown (10YR 3/2, 4/2 dry) on ped surfaces; light silty clay loam; dark grayish brown (10YR 4/2) inside peds with common fine faint dark yellowish brown (10YR 3/4) and few fine faint very dark grayish brown (10YR 3/2) mottles; moderate fine and medium subangular blocky structure; firm; a few fine pores in peds; few roots; neutral (pH 7.0); clear smooth boundary.
B3	19-25"	Dark grayish brown (10YR 4/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; a few fine faint very dark grayish brown streaks on peds; weak medium subangular blocky structure; friable; very few roots; a few soft dark brown aggregates; common fine pores; neutral (pH 7.0); gradual smooth boundary.
C1	25-32"	Grayish brown (10YR 5/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky; friable; very few roots; a few soft dark brown aggregates; moderately alkaline (pH 8.0); non-calcareous; clear smooth boundary.
A1b1	32-36"	Dark gray to dark grayish brown (10YR 4/1-4/2) on ped surfaces; silt loam; gray to grayish brown (10YR 5/1-5/2) inside peds with common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky; firm; a few soft dark brown aggregates; common fine pores in peds; moderately alkaline (pH 8.0); non-calcareous; clear smooth boundary.
C2	36-44"	Grayish brown (10YR 5/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; finely banded faint color striations 1 to 2 mm thick evident throughout; massive with some horizontal cleavage; friable; few fine pores; few fine soft dark brown aggregates; moderately alkaline (pH 8.0); non-calcareous; gradual smooth boundary.
C3	44-54"	Grayish brown (10YR 5/2) coarse silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; finely banded faint color striations 1 to 2 mm thick evident throughout; massive with some horizontal cleavage; friable; few fine soft dark brown aggregates; moderately alkaline (pH 8.0); non-calcareous; abrupt smooth boundary.
A1b2	54-60"	Dark gray (10YR 4/1) silty clay; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky; firm; few fine pores in peds; few soft dark brown aggregates; moderately alkaline (pH 8.0); non-calcareous; abrupt wavy boundary.
C4	60-62"	Grayish brown (10YR 5/2) coarse silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few fine pores; few soft dark brown aggregates; milkly alkaline (pH 8.0); non-calcareous; abrupt smooth boundary.
A1b3	62-70"	Dark gray (10YR 4/1) medium silty clay loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate fine subangular blocky; firm; a few pores in peds; moderately alkaline (pH 8.0); non-calcareous.
	36-54"	Very dark grayish brown (10YR 3/2) silt loam vertical krotovinas (2 each) 1 to 2 inches wide from 19 to 54 inches sampled from 36-54 inches.

Remarks: Munsell colors for moist soil unless otherwise stated.
Water table at 84" over heavy silty clay loam.
0-6" horizon sampled for La. Highway Dept.; 10-19" and 25-32" horizons sampled for La. Highway Dept. and Bureau of Public Roads.

Depth	Soil temperature (degrees C)
0-5"	27.5
58"	22.2 (from auger)
58"	22.0 (pit well)
84"	21.4 gray mottled heavy silty clay loam
150"	20.1 gray mottled heavy silty clay loam

Reaction by Hellige-Truog field kit.
Soil dry to depth of sampling.

Table 17.

Soil Series Commerce silt loam Location Tensas Parish, La.

Pedon No. 27 Laboratory No. S63-LA-54-1

PHYSICAL DATA

Hor-izon	Depth Inches	% Sand	% Silt C 50-20µ	M 20-5µ	F 5-2µ	Total	% Clay 2-0.2µ	0.2µ	Total	Text. Class
Ap1	0- 6	26.2				64.1			9.7	sil
Ap2	6-10	24.5				63.5			12.0	sil
B2	10-19	12.4				55.7			31.9	sil
B3	19-25	16.5				58.4			25.1	sil
C1	25-32	22.4				56.7			20.9	sil
Alb1	32-36	15.9				58.4			25.7	sil
C2	36-44	24.4				62.2			13.4	sil
C3	44-54	14.6				70.9			14.5	sil

CHEMICAL DATA

Hor-izon	% O.M.	pH H_2O	KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.	P_2 lb/A.
Ap1	1.60	6.6	5.9	10.4	7.7	2.3	tr	0.7	3.0	78	62	540
Ap2	1.03	6.1	5.2	11.4	8.5	2.2	0.1	0.4	3.1	78	30	480
B2	1.02	6.8	5.7	23.6	19.5	5.2	0.2	0.7	4.2	86	10	420
B3	0.76	7.2	5.9	19.9	16.7	4.6	0.2	0.6	2.4	90	8	500
C1	0.57	7.6	6.5	17.6	14.8	4.5	0.3	0.5	---	---	10	560
Alb1	0.71	7.7	6.8	20.7	16.8	5.6	0.4	0.6	---	---	6	560
C2	0.34	7.9	7.1	12.8	10.1	3.6	0.3	0.4	---	---	16	580

MOISTURE AND BULK DENSITY DATA

Hor-izon	% Water retained at specified tension(Bar) 0	1/3	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Den-sity	Poro-sity %
Ap1		---					5.2	----	----	
Ap2		17.7					6.1	0.18	1.55	42
B2		26.1					15.2	0.16	1.43	46
B3		24.8					12.4	0.17	1.36	49
C1		25.4					10.5	0.19	1.32	50
Alb1		26.7					13.1	0.18	1.30	51
C 2		29.0					7.1	0.29	1.32	50

MINERALOGICAL DATA

Hor-izon	Silt Fraction 5-2µ	Clay Fraction 2.0-0.2µ (Coarse)	<0.2-0 µ (Fine)
Ap1		M2 I2 K3 O3	M1
Ap2		-	-
B2		-	-
B3		M2 I3 K3 O3	M1
C1		-	-
Alb1		-	-
C2		MI I2 K2 O3	M1

* Values are for disturbed samples.

DUNDEE LOAM

Location: Tensas Parish, La., 1 1/2 mi west of Waterproof on Guthrie farm, 800 ft north and 360 ft west of intersection of La. Hw 566 and 3064; Spanish land grant Sec. 39, T 10 N, R 10 E (Photo 3BB-218)

Pedon No.: 28

Classification: Aeric Ochraqualfs, fine-silty, mixed, thermic

Slope: 1/2 percent

Drainage: Somewhat poorly drained

Samples collected by: J. DeMent, J. L. Walker, D. A. Brown, R. E. Phillips, S. A. Lytle, A. G. Caldwell, & Billie Nutt

On: October 29, 1963

Morphological description by: D. F. Slusher and Tracey Weems

Hor.	Depth	
Ap1	0-5"	Brown (10YR 4/3, 6/2 dry) loam; weak very fine granular; friable; roots common; neutral (pH 6.7); clear smooth boundary.
Ap2	5-8"	Brown (10YR 4/3, 6/3 dry) loam; massive in place but breaks to weak coarse platy; firm; a few roots; a few fine faint dark brown aggregates; a few clods of B21t, apparently from subsoiling, occurred throughout but were excluded in sampling; medium acid (pH 6.0); abrupt irregular boundary.
B21t	8-15"	Very dark grayish brown (10YR 3/2) (50%) and dark grayish brown (10YR 4/2) (50%) on ped surfaces; medium clay loam; dark grayish brown (10YR 4/2) with common fine distinct dark yellowish brown (10YR 4/4) and few fine faint grayish brown (10YR 5/2) mottles inside peds; moderate fine and medium subangular blocky adhering as weak medium prismatic; firm; distinct clay films in pores and on 60% of vertical and horizontal ped surfaces; few roots; common fine pores in peds; common fine dark brown aggregates; very strongly acid (pH 5.0); clear smooth boundary.
B22t	15-23"	Very dark grayish brown (10YR 3/2) (60%) and dark grayish brown (10YR 4/2) (40%) on ped surfaces; light clay loam; dark grayish brown (10YR 4/2) with common fine distinct dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) mottles inside peds; moderate medium subangular blocky adhering as weak medium prismatic; firm; distinct clay films in most pores and patchy clay films on 50% of ped surfaces; a few roots; common fine pores in peds; common soft dark brown aggregates; very strongly acid (pH 4.7); clear smooth boundary.
B3t	23-30"	Dark grayish brown (10YR 4/2) on ped surfaces; heavy loam; grayish brown (10YR 5/2) with common fine distinct dark yellowish brown (10YR 4/4) mottles inside peds; weak coarse subangular blocky adhering as weak medium prismatic; firm; distinct patchy clay films on 15% of ped surfaces; very few roots; few fine pores in peds; very few dark brown aggregates; very strongly acid (pH 5.0); clear smooth boundary.
C1	30-41"	Grayish brown (10YR 5/2) very fine sandy loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; very few roots; very few soft dark brown aggregates; few fine pores; strongly acid (pH 5.5); clear smooth boundary.
C2	41-53"	Grayish brown (10YR 5/2) loam; common fine distinct brown (10YR 4/3) mottles; massive; friable; very few roots; few fine pores; very few soft dark brown aggregates; strongly acid (pH 5.5); gradual smooth boundary.
C3	53-65"	Light brownish gray (10YR 6/2) very fine sandy loam; common fine distinct brown (10YR 4/3) mottles; massive; friable; very few fine pores; very few soft dark brown aggregates; medium acid (pH 6.0); clear smooth boundary.
C4	65-76"	Grayish brown (10YR 5/2) loam; common fine distinct brown (10YR 4/3) mottles; massive; friable; very few fine pores; very few dark brown aggregates; medium acid (pH 6.0); gradual smooth boundary. A stratum of light gray silty clay loam at 65-67" was excluded from the sample.
C5	76-90"	Grayish brown (10YR 5/2) heavy silt loam in upper part grading to very fine sandy loam in lower part; common fine distinct dark yellowish brown (10YR 4/4) and few fine faint yellowish brown (10YR 5/6) mottles; massive; friable; a few fine soft dark brown aggregates; medium acid (pH 6.0); gradual smooth boundary.

C6 90-102" Dark grayish brown (10YR 4/2) loamy fine sand; common fine distinct dark yellowish brown (10YR 4/4) mottles; single grain; loose; medium acid(pH 6.0).

Remarks: Dry to 90" when sampled, free water at 12 feet.
One vertical krotovina from 41-53 inches excluded from sample.
Field had been subsoiled 8-12" deep for last 3 or 4 years.
Reaction by Hellige-Truog field kit.
Munsell colors for moist soil unless otherwise stated.
0-5" sampled for La. Highway Dept.; 8-15", 15-23", and 41-53" sampled for La. Highway Dept. and Bureau of Public Roads.

Table 18.

Soil Series Dundee loam Location Tensas Pa., La.

Pedon No. 28 Laboratory No. S63-LA-54-3(1-11)

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap1	0- 5	44.8				42.8			12.4	l
Ap2	5- 8	44.8				42.9			12.3	l
B21t	8-15	27.9				42.4			29.7	cl
B22t	15-23	30.7				42.3			27.0	l or cl
B3t	23-30	44.3				35.0			20.7	l
C1	30-41	57.6				28.7			13.7	vfsl
C2	41-53	36.1				49.2			14.7	l

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.	P_2 lb/A.
Ap1	1.02	6.1	5.2	9.5	6.1	2.5	0.1	0.3	3.1	74	48	80
Ap2	.71	5.7	4.7	9.0	5.3	1.9	0.1	0.2	3.9	66	16	40
B21t	.78	5.2	3.8	20.2	12.0	3.6	0.4	0.5	9.1	64	24	60
B22t	.57	5.2	3.8	19.6	11.4	3.4	0.6	0.5	8.8	64	48	140
B3t	.43	5.4	3.8	15.9	9.6	2.8	0.6	0.4	6.9	66	60	200
C1	.28	5.5	3.9	12.0	7.5	1.9	0.4	0.3	4.9	67	84	380
C2	.22	5.4	3.9	13.0	8.7	2.0	0.4	0.3	5.0	70	76	360

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension(Bar) 0	1/3	2/3	1	3	5	15 *	Avail. Water In./In.	Bulk Density	Porosity %
Ap1		18.4					4.9	0.18	1.34	49
Ap2		13.4					5.2	0.13	1.53	42
B21t		20.1					13.0	0.11	1.59	40
B22t		22.5					12.8	0.14	1.48	44
B3t		19.4					9.6	0.15	1.48	44
C1		18.3					7.4	0.16	1.45	45
C2		23.5					8.0	0.22	1.39	48

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	< 0.2 -0μ (Fine)
Ap1		M2 I3 K3	M1
Ap2		-	-
B21t		M2 I3 K3	M1
B22t		-	-
B3t		-	-
C1		M2 I3 03	M1
C2			

* Values for disturbed samples.

GOLDMAN SILT LOAM

Location: Tensas Parish, La., 337 ft north of center of Hw 566, 100 ft west of private road, approx. 7 1/2 miles southwest of Waterproof, NW 1/4, SW 1/4, Sec. 11, T9N, R9E.

Pedon No.: 29

Classification: Aquic Hapludalfs coarse-silty, mixed, thermic

Slope: Convex 1-3 percent

Drainage: Well drained, runoff slow

Samples collected by: D. F. Slusher, A. G. Caldwell, & J. E. Seaholm

On: April 14, 1964

Morphological description by: Tracey A. Weems and D. F. Slusher

Hor.	Depth	
Ap	0-5"	Dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure; friable; many fine roots; medium acid (pH 5.8); abrupt smooth boundary.
B21t	5-9"	Dark brown (10YR 4/3) loam; few fine faint dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few streaks of grayish brown (10YR 5/2) and some peds coated with dark grayish brown (10YR 4/2); many fine roots; few pores in peds; medium acid (pH 6.0); abrupt smooth boundary.
B22t	9-18"	Brown (10YR 5/3) light loam; common fine faint light brownish gray (10YR 6/2) and few fine faint dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine roots; fine pores in peds; few patchy clay skins; medium acid (pH 6.0); clear smooth boundary.
B31	18-24"	Yellowish brown (10YR 5/4) very fine sandy loam; few fine distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; very friable; few fine pores in peds; few roots; few streaks of dark brown (10YR 4/3); strongly acid (pH 5.5); wavy boundary.
B32	24-32"	Yellowish brown (10YR 5/4) very fine sandy loam; common fine distinct light brownish gray (10YR 6/2) and few fine faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; few fine pores in peds; few patchy clay skins; strongly acid (pH 5.5); clear smooth boundary.
C1	32-44"	Variegated dark brown (10YR 4/3) and light brownish gray (10YR 6/2) fine sandy loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; few fine pores in peds; very few roots; few patchy clay skins; strongly acid (pH 5.5); clear smooth boundary.
C2	44-60"	Brown (10YR 5/3) very fine sandy loam; few fine faint light brownish gray (10YR 6/2) and very few dark yellowish brown (10YR 4/4) mottles; friable; medium acid (pH 6.0).
C3	60-72"	Dark grayish brown (10YR 4/2) very fine sandy loam; few fine distinct yellowish brown (10YR 5/6) and few light brownish gray (10YR 6/2) mottles; friable; medium acid (pH 6.0).
C4	72-88"	Dark brown (10YR 4/3) fine sandy loam; few fine faint light brownish gray (10YR 6/2) mottles; very friable; slightly acid (pH 6.5).

Remarks: Horizons C2, 44-60"; C3, 60-72"; and C4, 72-88" described with bucket auger.
Munsell colors for moist soil unless otherwise stated.
Reaction by Hellige-Truog field kit.

Table 19.

Soil Series Goldman silt loam   Location Tensas Parish, Louisiana

Pedon No. 29   Laboratory No. S64-LA-54-4(1-9)

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap	0-5	33.9				51.6			14.5	sil
B21t	5-9	35.8				44.9			19.3	l
B22t	9-18	56.5				27.6			15.9	sl
B31	18-24	73.3				14.0			12.7	sl
B32	24-32	69.4				16.5			14.1	sl
C1	32-44	43.7				39.1			17.2	l
C2	44-60	64.3				23.9			11.8	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.	P_2 lb/A
Ap	1.22	5.7	4.7	11.3	7.7	2.1	0.2	0.3	4.8	68	44	100
B21t	.59	6.0	4.5	14.8	10.2	2.7	0.2	0.2	5.4	71	32	160
B22t	.36	5.4	4.2	13.1	9.4	3.3	0.2	0.2	6.1	68	64	290
B31	.24	5.2	4.0	10.6	6.7	1.9	0.3	0.2	5.4	63	66	330
B32	.26	5.2	4.0	11.6	6.9	2.1	0.4	0.2	5.5	64	66	380
C1	.24	5.4	3.9	14.3	8.9	3.1	0.3	0.2	5.7	68	72	380
C2	.19	5.6	4.1	11.2	7.5	2.5	0.3	0.2	3.9	73	46	360

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Density	Porosity %
Ap		22.7					7.0	0.23	1.49	44
B21t		21.4					10.5	0.15	1.42	46
B22t		19.5					8.3	0.16	1.39	48
B31		18.1					6.5	0.15	1.34	49
B32		18.5					7.0	0.15	1.35	49
C1		20.8					8.6	0.17	1.45	45
C2		22.5					6.4	0.23	1.40	47

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	< 0.2-0μ (Fine)		
Ap		M3 I3 K3 Q3	M1 I3 K3		
B21t		-	-		
B22t		-	-		
B31		M2 I3 K3	M1 I3		
B32		-	-		
C1		-	-		
C2		M2 I2 K2 Q3	M1 I3		

*Values for disturbed samples

SHARKEY CLAY

Location: Tensas Parish, La., 3 mi southwest of St. Joseph; 100 ft west of gravel road 3/4 mile south of railroad; right corner of 1/4 sec. NE 1/4, NW 1/4 Sec. 46 T 10 N, R 11 E.

Pedon No.: 30

Classification: Vertic Haplaquepts, very fine, montmorillonitic, nonacid, thermic

Slope: Nearly level (less than 1/2%) Drainage: Poorly drained

Samples collected by: D. F. Slugher, A. G. Caldwell, and G. Colvin

On: April 16, 1964

Morphological description by: Tracey A. Weems and D. F. Slusher

Hor.	Depth	
Ap	0-5"	Dark grayish brown (10YR 4/2) clay; weak fine granular structure; firm; few root channels filled with very dark grayish brown (10YR 3/2); some fine streaks of dark gray (10YR 4/1) clay; many fine roots; slightly acid (pH 6.5); clear smooth boundary,
B21g	5-11"	Dark gray (10YR 4/1) clay; common fine faint dark yellowish brown (10YR 4/4) mottles; moderate fine angular blocky structure that breaks down to very fine angular blocky structure; firm; many fine roots; medium acid (pH 6.0); clear smooth boundary.
B22g	11-17"	Dark gray (10YR 4/1) clay; few fine faint dark yellowish brown (10YR 4/4) mottles; moderate fine subangular blocky structure; firm; few fine roots; concentration of dark yellowish brown (10YR 4/4) mottles around medium size roots; neutral (pH 6.6); gradual smooth boundary.
B23g	17-28"	Dark gray (10YR 4/1) clay; common fine faint dark yellowish brown (10YR 4/4) mottles; moderate fine subangular blocky structure that breaks down to very fine subangular blocky structure; firm; few blotches of strong brown (7.5YR 5/6); few slicken sides 1/4 to 1 inch in size; few fine roots; neutral (pH 7.0); gradual smooth boundary.
B24g	28-38"	Dark gray (10YR 4/1) clay; common fine faint dark yellowish brown (10YR 4/4) mottles; moderate coarse subangular blocky structure that breaks down to medium and fine subangular blocky structure; very firm; few fine blotches of strong brown (7.5YR 5/6); prominent slicken sides 3 to 6 inches in diameter; distinct small lime concretions 2 to 4 mm in diameter; very few roots; mildly alkaline (pH 7.5); gradual smooth boundary.
B3g	38-50"	Gray (10YR 5/1) clay; common fine faint dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; very firm; few very fine roots; small iron and manganese concretions; weakly calcareous; moderately alkaline (pH 8.0).

Remarks: Soil wet to 28 inches, slightly moist below.
Munsell colors for moist soil unless otherwise stated.
Reaction by Hellige-Truog field kit.

Table 2G.

Soil Series Sharkey clay Location Tensas Pa., La.

Pedon No. 30 Laboratory No. S64-LA-54-7(1-6)

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0-5	-				22.8			77.2	c
B21g	5-11	-				15.8			84.2	c
B22g	11-17	-				13.3			86.7	c
B23g	17-28	-				12.5			87.5	c
B24g	28-38	-				17.4			82.6	c
B3g	38-50	2.5				20.4			77.1	c

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.	P_2 lb/A
					Exchangeable Cations me/100g.							
Ap	4.29	5.7	4.8	49.1	31.3	10.7	0.3	1.4	14.6	75	72	310
B21g	1.88	5.3	4.3	51.2	31.6	12.4	0.4	1.2	16.0	74	42	240
B22g	1.45	5.8	4.8	53.8	33.6	13.8	0.7	1.1	12.7	80	30	180
B23g	1.12	6.4	5.4	55.9	34.8	14.6	1.0	1.1	11.1	82	24	130
B24g	.95	7.5	6.9	53.1	40.3	15.7	2.0	1.0	7.9	88	36	140
B3g	.74	7.5	7.0	49.1	42.8	16.7	2.4	1.0	6.6	90	28	100

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Density	Porosity %
Ap		37.2					29.5	.08	1.06	60
B21g		43.3					30.8	.13	1.05	60
B22g		47.2					32.0	.16	1.05	60
B23g		50.0					32.2	.19	1.08	59
B24g		45.3					31.1	.18	1.26	52
B3g		42.1					29.0	.18	1.34	49

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction < 0.2-0μ (Fine)	
Ap		M2 I2 K2 Q3	M1 I3	
B21g		-	-	
B22g		M2 I2 K2 Q3	M1 I3	
B23g		-	-	
B24g		-	-	
B3g		M2 I2 K2 Q3	M1	

*Values for disturbed cores

SOIL ASSOCIATIONS[1]

Soil Association Map

The general soil map in the pocket folder of this publication shows the soil associations in the Southern Mississippi Valley Alluvium. A soil association is a landscape that has a distinctive proportional pattern of soil families. It normally consists of one or more major soil families and several soils of minor extent, and is named for the major soil families. The soils of one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a broad area, who want to compare different parts of the area, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is not suitable for planning the management or use of a specific field or tract because the soils in any one association ordinarily differ in characteristics that affect use and management. The precise location of a specific kind of soil cannot be determined from the map; however, the approximate extent of that kind of soil within the broad area can be estimated. For example, it cannot be determined from this map that a particular crop can be grown on a selected farm, but the extent of soils suitable for production of that crop can be determined for an area. Information of this kind is useful for generalized planning, such as possible location of a processing plant for the crop. Detailed maps, available through the National Cooperative Soil Survey, should be used in planning for a particular farm, field, or development tract.

The soil series in each soil family are listed in Table 21. Each family contains one or more series and the family is named for the dominant series. An example is the Dubbs family which includes Dubbs, Gallion, and Rilla series. The interpretations for the Dubbs family apply to these series. More information for each series in the Southern Mississippi Valley Alluvium can be obtained from standard soil series descriptions that are available in the offices of the Soil Conservation Service. In addition, pedon descriptions for many of the series are included in this monograph.

Description of Soil Associations

The soil associations are described in this section. Selected interpretations for the soil families in the associations are in Table 22. These interpretations include flood hazard, shrink-swell poten-

1. R. C. Carter and O. R. Carter, State Soil Scientist, Mississippi, and Soil Correlation Specialist, Arkansas, SCS, respectively.

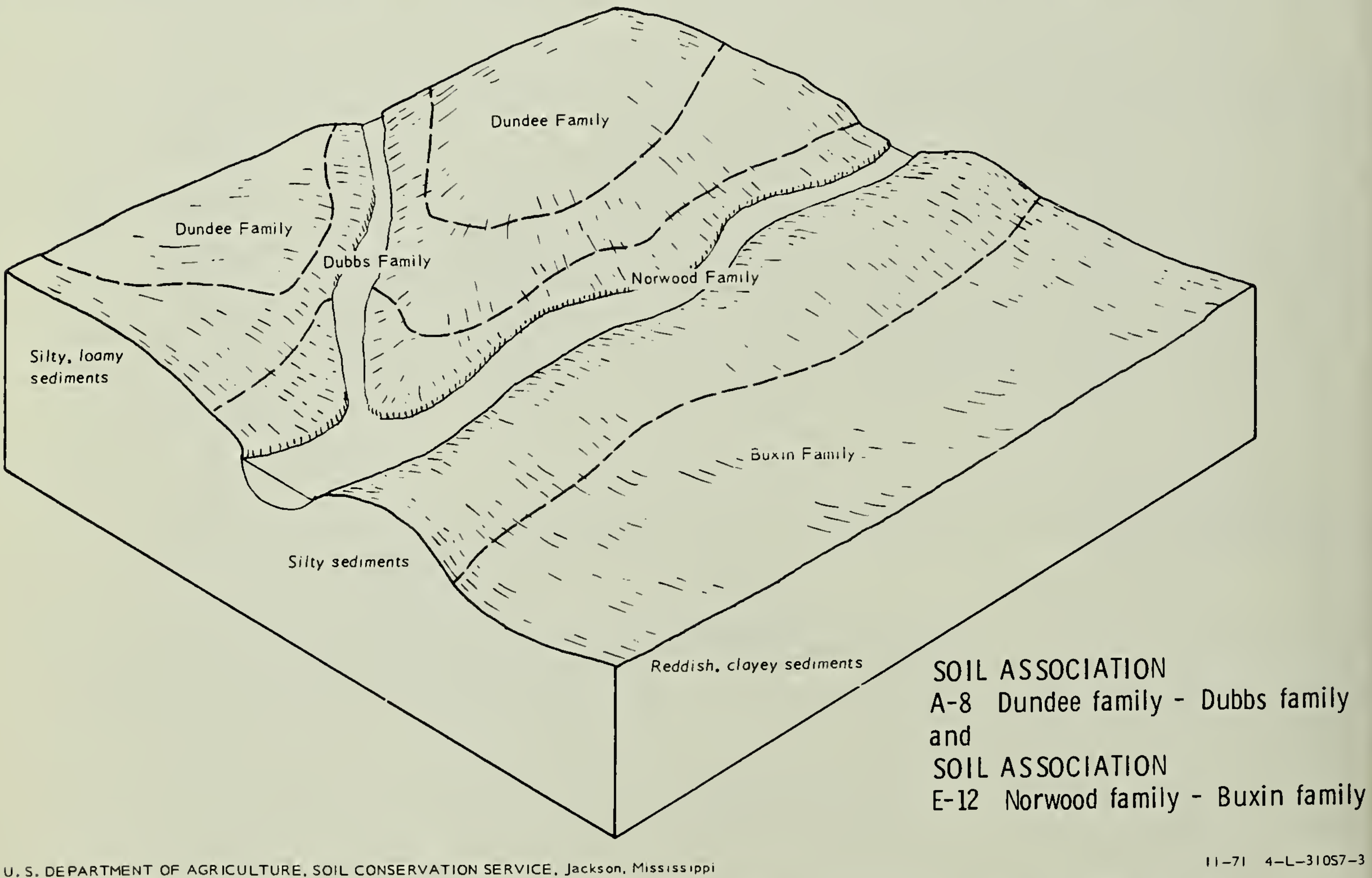

Fig. 16. Physiographic Distribution of Soil Associations (A-8, E12) Dundee-Dubbs Families

tial, suitability for different uses, and limitations for nonfarm uses.

Soil association A-5, Dundee family, is an example of how this table can be used. Dundee family is estimated to be 60 percent of the association, and other soils 40 percent. Interpretations apply only to the Dundee family. They do not apply to the other soils and to the association as a whole, due to variability of these soils. These interpretations present guidelines for the user to recognize and determine problems in use and management of the soils.

The physiographic distribution of soil associations is illustrated for soil association (A-8 ER) Dundee-Dubbs families in Figure 16; soil association (I-2) Alligator-Forestdale families, and soil association (E-10) Barbary-Sharkey families in Figures 17 and 18.

Brief descriptions of the soil drainage, family texture, topographic position, use of the soils, and special management problems are given for each association. Many of the associations contain the same soil families, but they differ in percentage composition or management problems. There is overlapping information in many of the associations. The reader need read only descriptions of the associations in which he is interested .

A-1. Guyton family association: Poorly drained silty soils on flood plains and low natural levees.

The Guyton family consists of soils on broad silty ter-

Table 21. Classification of Soil Series in Soil Families

Soil series	*Common family name*	*Technical family name*
Adler	Adler	Coarse-silty, mixed, nonacid, thermic, Aquic Udifluvents
Alligator	Alligator	Very-fine, montmorillonitic, acid, thermic, Vertic Haplaquepts
Amagon	Amagon	Fine-silty, mixed, thermic, Typic Ochraqualfs
Barbary	Barbary	Very-fine, montmorillonitic, nonacid, thermic, Typic Hydraquents
Bonn	Bonn	Fine-silty, mixed, thermic, Glossic Natraqualfs
Bosket	Bosket	Fine-loamy, mixed, thermic, Mollic Hapludalfs
Bruin	Bruin	Coarse-silty, mixed, thermic, Fluvaquentic Eutrochrepts
Buxin	Buxin	Fine, mixed, thermic, Vertic Hapludolls
Caspiana	Tiptonville	Fine-silty, mixed, thermic, Typic Argiudolls
Collins	Collins	Coarse-silty, mixed, acid, thermic, Aquic Udifluvents
Commerce	Commerce	Fine-silty, mixed, nonacid, thermic, Aeric Fluvaquents
Convent	Convent	Coarse-silty, mixed, nonacid, thermic, Aeric Fluvaquents
Crevasse	Crevasse	Mixed, thermic, Typic Udipsamments
Desha	Desha	Very-fine, mixed, thermic, Vertic Hapludolls
Dubbs	Dubbs	Fine-silty, mixed, thermic, Typic Hapludalfs
Dundee	Dundee	Fine-silty, mixed, thermic, Aeric Ochraqualfs
Falaya	Falaya	Coarse-silty, mixed, acid, thermic, Aeric Fluvaquents
Foley	Foley	Fine-silty, mixed, thermic, Albic Glossic Natraqualfs
Forestdale	Forestdale	Fine, montmorillonitic, thermic, Typic Ochraqualfs
Gallion	Dubbs	Fine-silty, mixed, thermic, Typic Hapludalfs
Guyton	Guyton	Fine-silty, siliceous, thermic, Typic Glossaqualfs
Hayti	Mhoon	Fine-silty, mixed, nonacid, thermic, Typic Fluvaquents
Hebert	Dundee	Fine-silty, mixed, thermic, Aeric Ochraqualfs
Iberia	Iberia	Fine, montmorillonitic, thermic, Vertic Haplaquolls
McGehee	Dundee	Fine-silty, mixed, thermic, Aeric Ochraqualfs
Mer Rouge	Tiptonville	Fine-silty, mixed, thermic, Typic Argiudolls
Mhoon	Mhoon	Fine-silty, mixed, nonacid, thermic, Tynic Fluvaquents
Moreland	Buxin	Fine, mixed, thermic, Vertic Hapludolls
Morganfield	Morganfield	Coarse-silty, mixed, nonacid, thermic, Typic Udifluvents
Norwood	Norwood	Fine-silty, mixed, (calcareous), thermic, Typic Udifluvents
Perry	Sharkey	Very-fine, montmorillonitic, nonacid, thermic, Vertic Haplaquepts
Portageville	Portageville	Fine, montmorillonitic (calcareous), thermic, Vertic Haplaquolls
Portland	Portland	Very-fine, mixed, nonacid, thermic, Vertic Haplaquepts
Reelfoot	Reelfoot	Fine-silty, mixed, thermic, Aquic Argiudolls
Rilla	Dubbs	Fine-silty, mixed, thermic, Typic Hapludalfs
Robinsonville	Robinsonville	Coarse-loamy, mixed, nonacid, thermic, Typic Udifluvents
Sharkey	Sharkey	Very-fine, montmorillonitic, nonacid, thermic, Vertic Haplaquepts
Tensas	Tensas	Fine, montmorillonitic, thermic, Vertic Ochraqualfs
Tiptonville	Tiptonville	Fine-silty, mixed, thermic, Typic Argiudolls
Tunica	Tunica	Clayey over loamy, montmorillonitic, nonacid, thermic, Vertic Haplaquepts
Una	Una	Fine, mixed, acid, thermic, Typic Haplaquepts
Wardell	Wardell	Fine-loamy, mixed, thermic, Mollic Ochraqualfs
Waverly	Waverly	Coarse-silty, mixed, acid, thermic, Typic Fluvaquents

Table 22. — Selected Interpretations for Soil Families in Soil Associations (The definitions used for the interpretations are listed on pages 72 and 73).

Map symbol and association	Components: Soil families	Components: Estimated %[1]	Flood hazard	Shrink-swell potential	Suitability for: Tilled crops	Suitability for: Woodland	Suitability for: Pasture	Soil limitations for: Roads and streets	Soil limitations for: Buildings	Soil limitations for: Sewage lagoons	Soil limitations for: Septic tank absorption field
A-1 Guyton family	Guyton	50	Slight	Low	Fair	Fair	Fair	Severe	Severe	Slight	Severe
A-2 Bonn family—	Bonn	35	Slight	Low	Poor	Poor	Fair	Severe	Severe	Slight	Severe
Foley family	Foley	30	Slight	Moderate	Fair	Fair	Fair	Severe	Severe	Slight	Severe
A-3 Foley family—	Foley	35	Slight	Moderate	Fair	Fair	Fair	Severe	Severe	Slight	Severe
Forestdale family	Forestdale	35	Slight	High	Fair	Fair	Well	Severe	Severe	Slight	Severe
A-4 Amagon family—	Amagon	40	Slight	Moderate	Fair	Fair	Well	Severe	Severe	Slight	Severe
Dundee family	Dundee	35	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
A-5 Dundee family	Dundee	60	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
A-6 Dundee family—	Dundee	50	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
Baldwin family	Baldwin	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
A-7 Dundee family—	Dundee	40	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
Crevasse family	Crevasse	30	Slight	Low	Poor	Fair	Fair	Slight	Slight	Severe	Slight
A-8 Dundee family—	Dundee	35	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
Dubbs family	Dubbs	30	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Moderate	Slight
A-9 Dundee family—	Dundee	40	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
Forestdale family	Forestdale	30	Slight	High	Fair	Fair	Well	Severe	Severe	Slight	Severe
A-10 Dundee family—	Dundee	40	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
Sharkey family	Sharkey	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
A-11 Dundee family—	Dundee	35	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
Tensas family	Tensas	35	Slight	High	Fair	Fair	Well	Severe	Severe	Slight	Severe
A-12 Dundee family—	Dundee	50	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
Wardell family	Wardell	25	Slight	Low	Fair	Fair	Well	Severe	Severe	Moderate	Severe
A-13 Forestdale family—	Forestdale	40	Slight	High	Fair	Fair	Well	Severe	Severe	Slight	Severe
Alligator family	Alligator	35	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
A-14 Tensas family—Sharkey	Tensas	40	Moderate	High	Fair	Fair	Well	Severe	Severe	Slight	Severe
family, undulating	Sharkey	40	Moderate	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
A-15 Bosket family—	Bosket	35	Slight	Moderate	Well	Well	Well	Slight	Slight	Moderate	Slight
Dubbs family	Dubbs	35	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Moderate	Slight
A-16 Dubbs family—	Dubbs	50	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Moderate	Slight
Dundee family	Dundee	30	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
E-1 Commerce family—	Commerce	35	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Slight	Severe
Bruin family	Bruin	30	Slight	Low	Well	Well	Well	Moderate	Moderate	Moderate	Moderate
E-2 Commerce family—	Commerce	35	Severe	Moderate	Poor	Well	Fair	Severe	Severe	Severe	Severe
Convent family, flooded	Convent	30	Severe	Low	Poor	Well	Fair	Severe	Severe	Severe	Severe
E-3 Commerce family—	Commerce	50	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Slight	Severe
Dundee family	Dundee	30	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
E-4 Commerce family—	Commerce	50	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Slight	Severe
Mhoon family	Mhoon	25	Slight	Moderate	Fair	Fair	Well	Severe	Severe	Slight	Severe
E-5 Commerce family—	Commerce	45	Moderate	Moderate	Fair	Well	Well	Severe	Severe	Severe	Severe
Robinsonville family	Robinsonville	25	Moderate	Low	Fair	Well	Well	Severe	Severe	Severe	Severe
E-6 Commerce family—	Commerce	40	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Slight	Severe
Sharkey family	Sharkey	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
E-7 Falaya family—	Falaya	40	Slight	Low	Well	Well	Well	Severe	Severe	Moderate	Severe
Collins family	Collins	25	Slight	Low	Well	Well	Well	Severe	Severe	Moderate	Severe
E-8 Mhoon family—	Mhoon	45	Slight	Moderate	Fair	Fair	Well	Severe	Severe	Slight	Severe
Portageville family	Portageville	25	Slight	High	Fair	Fair	Well	Severe	Severe	Slight	Severe
E-9 Waverly family—	Waverly	35	Moderate	Low	Fair	Fair	Well	Severe	Severe	Severe	Severe
Falaya family	Falaya	35	Moderate	Low	Fair	Well	Well	Severe	Severe	Severe	Severe

Table 22. — Selected Interpretations for Soil Families in Soil Associations (cont'd.)

Map symbol and association	Components: Soil families	Components: Estimated %[1]	Flood hazard	Shrink-swell potential	Suitability for: Tilled crops	Suitability for: Woodland	Suitability for: Pasture	Soil limitations for: Roads and streets	Soil limitations for: Buildings	Soil limitations for: Sewage lagoons	Soil limitations for: Septic tank absorption field
E-10 Barbary family—	Barbary	50	Severe	High	Poor	Fair	Poor	Severe	Severe	Severe	Severe
Sharkey family	Sharkey	45	Severe	Very high	Poor	Fair	Fair	Severe	Severe	Severe	Severe
E-11 Adler family—	Adler	35	Slight	Low	Well	Well	Well	Severe	Severe	Moderate	Severe
Morganfield family	Morganfield	35	Slight	Low	Well	Well	Well	Severe	Severe	Moderate	Severe
E-12 Norwood family—	Norwood	60	Moderate	Low	Fair	Well	Well	Severe	Severe	Severe	Severe
Buxin family	Buxin	30	Moderate	Very high	Fair	Fair	Well	Severe	Severe	Severe	Severe
E-13 Robinsonville family—	Robinsonville	35	Moderate	Low	Fair	Well	Well	Severe	Severe	Severe	Severe
Commerce family	Commerce	25	Moderate	Moderate	Fair	Well	Well	Severe	Severe	Severe	Severe
E-14 Crevasse family, undulating	Crevasse	60	Slight	Low	Poor	Fair	Fair	Slight	Slight	Severe	Slight
E-15 Crevasse family—	Crevasse	45	Slight	Low	Poor	Fair	Fair	Slight	Slight	Severe	Slight
Dundee family	Dundee	30	Slight	Moderate	Well	Well	Well	Moderate	Severe	Slight	Severe
E-16 Crevasse family—Robinson-	Crevasse	30	Severe	Low	Poor	Fair	Poor	Severe	Severe	Severe	Severe
ville family, undulating	Robinsonville	30	Severe	Low	Poor	Well	Fair	Severe	Severe	Severe	Severe
I-1 Alligator family	Alligator	60	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
I-2 Alligator family—	Alligator	50	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Forestdale family	Forestdale	25	Slight	High	Fair	Fair	Well	Severe	Severe	Slight	Severe
I-3 Sharkey family	Sharkey	65	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
I-4 Sharkey family, flooded	Sharkey	80	Severe	Very high	Poor	Fair	Fair	Severe	Severe	Severe	Severe
I-5 Sharkey family—	Sharkey	45	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Alligator family	Alligator	35	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
I-6 Sharkey family—	Sharkey	45	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Bowdre family	Bowdre	25	Slight	Moderate	Fair	Fair	Well	Severe	Severe	Severe	Severe
I-7 Sharkey family—	Sharkey	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Commerce family	Commerce	30	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Slight	Severe
I-8 Sharkey family—Crevasse	Sharkey	60	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
family, undulating	Crevasse	20	Slight	Low	Poor	Fair	Fair	Slight	Slight	Severe	Slight
I-9 Sharkey family—	Sharkey	45	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Desha family	Desha	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
I-10 Sharkey family—	Sharkey	45	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Portland family	Portland	35	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
I-11 Sharkey family	Sharkey	45	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Tunica family	Tunica	30	Slight	High	Fair	Fair	Well	Severe	Severe	Moderate	Severe
I-12 Una family	Una	60	Moderate	High	Fair	Fair	Fair	Severe	Severe	Severe	Severe
I-13 Beulah family—	Beulah	40	Slight	Low	Fair	Well	Well	Slight	Slight	Severe	Slight
Crevasse family	Crevasse	35	Slight	Low	Poor	Fair	Fair	Slight	Slight	Severe	Slight
M-1 Iberia family—	Iberia	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Baldwin family	Baldwin	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
M-2 Iberia family—	Iberia	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Sharkey family	Sharkey	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
M-3 Reelfoot family—	Reelfoot	60	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Moderate	Severe
Tiptonville family	Tiptonville	30	Slight	Moderate	Well	Well	Well	Moderate	Moderate	Moderate	Slight
M-4 Buxin family	Buxin	85	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
M-5 Buxin family—	Buxin	40	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
Portland family	Portland	35	Slight	Very high	Fair	Fair	Well	Severe	Severe	Slight	Severe
X-1 Marsh	Marsh	90	Severe		Poor	Fair	Poor	Severe	Severe	Severe	Severe

[1]Other soils too variable to rate account for the remaining percentage.

races and on flood plains of streams draining silty terraces and uplands. These are low wet areas mainly along the Ouachita River and its tributaries. Slopes are dominantly 0 to 1 percent but range to 3%. Other soils in this association are those of the Alligator, Dundee, Frizzell, Rosebloom, and Una series.

At present, due to wetness and overflow, the soils in the association are used mainly for woodland, with lesser acreages used for pastures. These soils are suited for growing pastures and tilled crops when adequately drained and protected from flooding. Wetness is severely limiting for most nonfarm uses.

A-2. **Bonn family-Foley family association.** Poorly drained silty soils with high sodium on terraces.

These soils are on old stream terraces, locally known as post oak flats. Slopes are less than 2% and natural drainage channels are shallow and meandering. Other soils in this association are the Alligator, Amagon, Collins, Dundee, and Falaya series.

The upper B horizons in the soils of the Bonn family are high in sodium, which causes poor physical conditions in the soil and limits plant growth. The Bonn soils are poorly suited for crops and trees. They are fairly well suited for pasture.

Soils of the Foley family have sodium in the lower B horizon, which is somewhat limiting to plant growth. The Foley soils are fairly well suited for crops and pastures.

This association is used mainly for pastures and woodlands; smaller acreages are used for tilled crops. Wetness is severely limiting for most nonfarm uses.

A-3. **Foley family-Forestdale family association:** Poorly drained silty soils with high sodium and clayey soils on terraces.

This association is on stream terraces with low local relief. Slopes are dominantly less than 2% but range to 3%. Natural drainageways are shallow and poorly defined. Other soils in this association are the Alligator, Amagon, Dundee, and Mhoon series.

The high sodium content in the lower B horizon of Foley soils is somewhat limiting to plant growth. These soils are used for tilled crops, pastures, and woodlands.

The Forestdale soils are wet and slowly permeable. When drained, these soils are fairly well suited for tilled crops, woodland, and pasture. Wetness causes severe limitations for most nonfarm uses.

A-4. **Amagon family-Dundee family association.** Poorly and somewhat poorly drained silty soils on natural levees.

These soils are on old natural levees along abandoned river channels, oxbow lakes, and bayous. Most of the soils are level or nearly level, but some are undulating, with alternate low ridges and swales. Slopes are dominantly 0 to 3% but range to 8%. The Amagon family is on the lower and more level parts of the association. The Dundee family is on the higher and more sloping areas on natural levees. Other soils in this association are those of the Bosket, Dubbs, and Foley series.

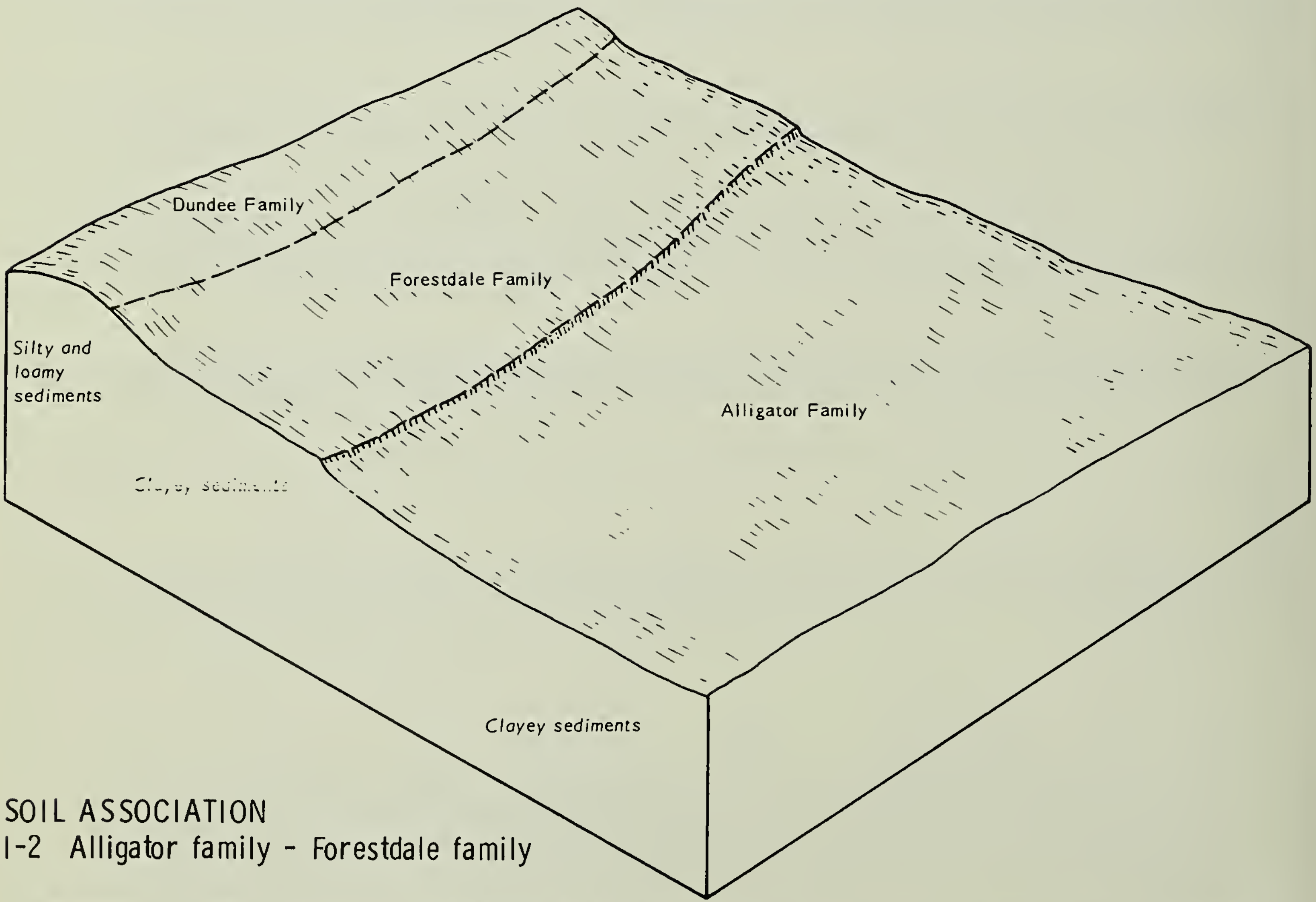

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Fig. 17. Physiographic Distribution of Soil Associations (I-2) Alligator-Forestdale Families

Most of these soils are drained and protected from flooding. The poorly drained Amagon soils are fairly well suited for tilled crops and pastures. The Dundee soils are well suited. Due to wetness these soils have moderate to severe limitations for most nonfarm uses.

A-5. **Dundee family association:** Somewhat poorly drained silty soils on natural levees.

This association is on natural levees along old stream channels and bayous. Most of the soils are level or nearly level, with slopes of 0 to 3%. Where present-day drainage has dissected the natural levees, slopes range to 8%. Other soils in this association are those of the Amagon, Bosket, and Dubbs series.

These soils are drained and are well suited for tilled crops and pastures. Due to wetness, they have moderate to severe limitations for most nonfarm uses.

A-6. **Dundee family-Baldwin family association:** Somewhat poorly drained silty soils and poorly drained clayey soils on natural levees.

These soils are on natural levees along old stream channels and bayous. Most of the soils are level or nearly level with slopes of 0 to 3%. The Dundee family is on the higher part of these levees and the Baldwin family. is on the lower parts and depressional areas. Other soils in this association are in the Iberia, Mhoon, and Sharkey series.

The Dundee soils are well suited for agricultural uses. The Baldwin soils are fairly well to well suited. Soil wetness and very high shrink-swell of the Baldwin series cause severe limitations for most nonfarm uses.

A-7. **Dundee family-Crevasse family association:** Somewhat poorly drained silty soils and excessively drained sandy soils.

This association is on low natural levees and flood plains. Slopes range from 0 to 3%. The Dundee family is on the higher natural levees and the Crevasse family is on the flood plains. Other soils in this association are those in the Amagon, Dubbs, and Forestdale series.

When drained, these soils are used for tilled crops. The Dundee soils are well suited for tilled crops. Wetness causes moderate to severe limitations for nonfarm uses. Crevasse soils are drouthy and poorly suited for tilled crops. They have slight limitations for most nonfarm uses.

A-8. **Dundee family-Dubbs family association:** Somewhat poorly and well drained silty soils on natural levees.

These soils are on old natural levees along abandoned river channels, bayous, and oxbow lakes. These levees are long, slightly higher ridges than the surrounding countryside. Slopes are dominantly 0 to 3% but the escarpments around the ridges range to 8%. The Dundee family is on the lower parts of the association and the Dubbs family is on the ridgecrests and side slopes. Other soils in this association are the Amagon, Askew, Bosket, Goldman, Sterlington, and Tutwiler series.

The soils in this association are cleared and are well

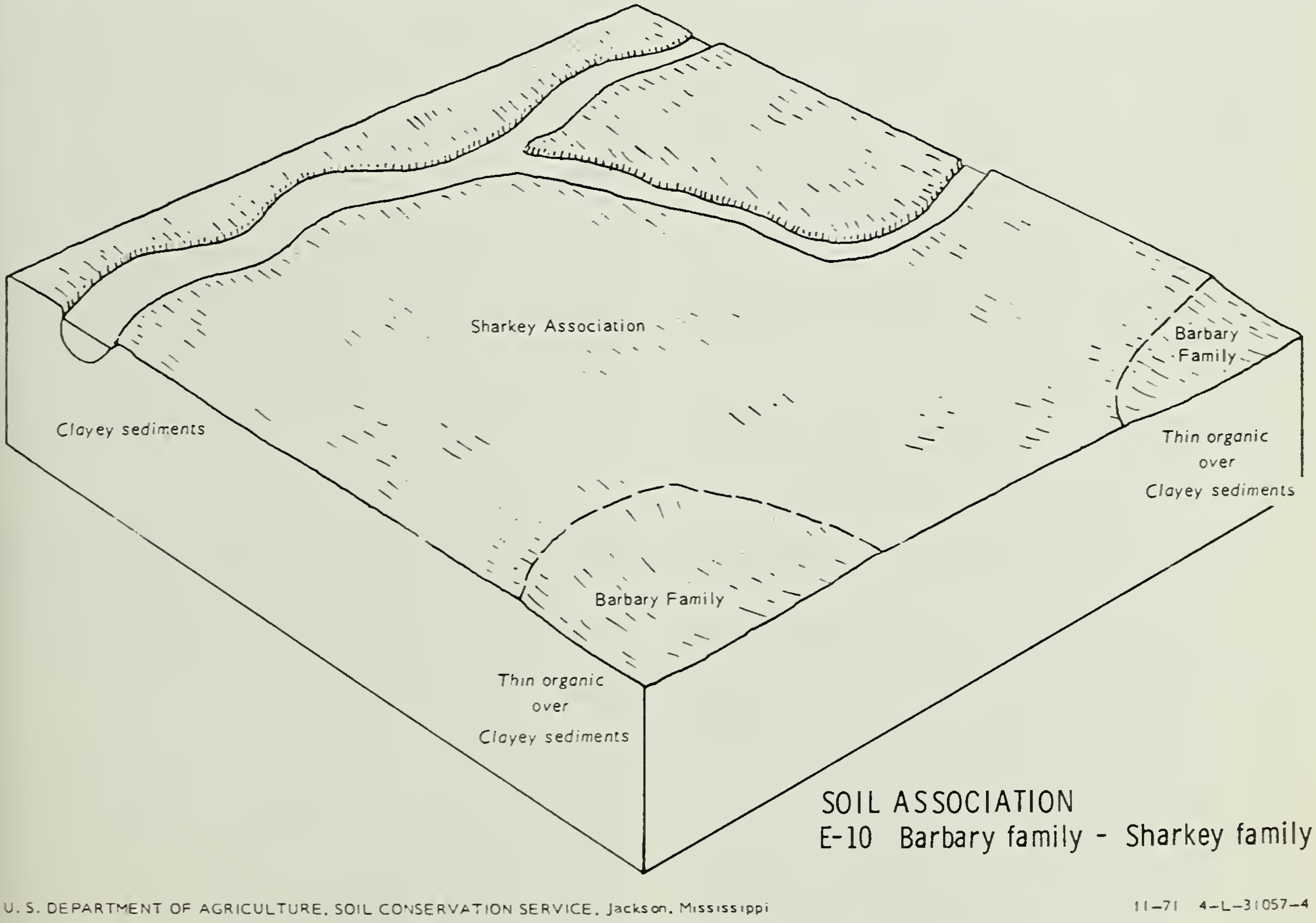

Fig. 18. Physiographic Distribution of Soil Associations (E-10) Barbary-Sharkey Families

suited for tilled crops, woodland and pasture. Due to wetness, the Dundee soils have moderate to severe limitations and the Dubbs soils have moderate limitations for most nonfarm uses.

A-9. **Dundee family-Forestdale family association:** Somewhat poorly drained silty soils and poorly drained clayey soils on natural levees.

This association is on natural levees along abandoned river channels and bayous. Most of the soils are level or nearly level, but some are undulating with low ridges and swales. Slopes are dominantly 0 to 3% but range to 8%. The Dundee family is on higher and more sloping areas. The Forestdale family is on the lower and the flatter parts of the association. Other soils in this association are in the Amagon and Dubbs series.

Most areas of these soils are drained and used for crops. Dundee soils are well suited for tilled crops and Forestdale soils are fairly well suited. Wetness and high shrink-swell potential of the Forestdale soils cause severe limitations for most nonfarm uses.

A-10. **Dundee family-Sharkey family association:** Somewhat poorly drained silty soils on natural levees and poorly drained clayey soils on flood plains.

These soils are on natural levees and flood plains along major Mississippi River tributaries such as the White River. Slopes are less than 3% except for escarpments which sometimes exceed 15%. The Dundee family is on the higher natural levee. The Sharkey family is on the flood plain. Other soils in this association are the Amagon, Forestdale, and Tunica series.

These soils are used mainly for tilled crops. The Dundee soils are well suited and the Sharkey series fairly well suited for tilled crops. Wetness of the Dundee soils and wetness and very high shrink-swell potential of the Sharkey soils cause severe limitations for nonfarm use.

A-11. **Dundee family-Tensas family association:** Somewhat poorly drained silty and clayey soils on natural levees.

This association is on old natural levees. Soils are nearly level or are undulating with irregular low ridges and swales. Slopes are 0 to 3%. The Tensas family is usuallly in the convex parts of the landscape. Other soils in this association include the Alligator, Commerce, Mhoon, Sharkey, and Tunica series.

The soils of this association are used for tilled crops, pastures, and woodlands. The Dundee soils are well suited and Tensas soils fairly well suited for tilled crops. Wetness of the soils and the high shrink-swell potential of the Tensas soils cause severe limitations for most nonfarm uses.

A-12. **Dundee family-Wardell family association:** Somewhat poorly drained silty soils and poorly drained loamy soils on natural levees.

These soils are on natural levees along old stream channels in the northern part of the Southern Mississippi Valley Alluvium. Most soils are level or nearly level with slopes of less than 3%. The Dundee family is on the higher areas; the Wardell family is on the lower areas and along the depression. Other soils in this association are the Amagon, Bosket, Dubbs, and Sharkey series.

Most of these soils are drained and used for growing crops and pastures. Due to wetness, they have moderate to severe limitations for most nonfarm uses.

A-13. **Forestdale family-Alligator family association:** Poorly drained clayey soils on natural levees and flood plains.

These soils are on natural levees and flood plains along old stream channels. Slopes are less than 2%. The Forestdale family is on the natural levees and the Alligator family is on the flood plains. Other soils in this association include the Dundee, Earle, Tensas, and Tunica series.

Most soils are cleared and used for tilled crops and pastures. Some areas are in hardwood forest. These wet soils have high to very high shrink-swell which causes severe limitations for most nonfarm uses.

A-14. **Tensas family-Sharkey family association, undulating:** Poorly drained clayey soils on low natural levees and flood plains.

This association is on low natural levees and flood plains, mainly along Mississippi River tributaries. Over most of the area, slopes are undulating with irregular low ridge and swale pattern. Slopes range from 0 to 3%. The Tensas family is on the natural levees and the Sharkey family is on the flood plains. Other soils in this association are the Commerce, Mhoon, Newellton, and Tunica series.

Soils in this association are used mainly for pastures, woodlands, and lesser acreages are used for tilled crops. Due to wetness and high to very high shrink-swell potential, they have severe limitations for nonfarm uses.

A-15. **Bosket family-Dubbs family association:** Well drained loamy soils and well drained silty soils on natural levees.

This association is on broad natural levees or stream divides, mainly between old former channels of the Mississippi River. Slopes are dominantly 0 to 3% but range to 8%. The Bosket family is generally on the higher parts of the levee and on the levee slopes nearest the old stream channel. Other soils in this association are the Amagon, Askew, Dundee, Sterlington, and Tutwiler series.

These are some of the most productive soils and are well suited for most agricultural uses. They have slight to moderate limitations for most nonfarm uses.

A-16. **Dubbs family-Dundee family association:** Well and somewhat poorly drained silty soils on natural levees.

These soils are on old natural levees along abandoned river channels, bayous, and oxbow lakes. These levees are long and slightly higher ridges than the surrounding landscape. Slopes are dominantly 0 to 3% but range to 8% on escarpments around the ridges. Dubbs family is on the ridgecrests and side slopes and Dundee family is on lower to depressional parts of the association. Other soils in this association are the Amagon, Askew, Bosket, Goldman, Sterlington, and Tutwiler series.

Soils in this association are mainly cleared and used for tilled crops and pastures. These soils are well suited for all agricultural uses. Due to wetness, the Dundee soils have moderate to severe limitations for most nonfarm uses. The Dubbs soils have slight to moderate limitations.

E-1. **Commerce family-Bruin family association:** Somewhat poorly drained silty soils on flood plains and moderately well drained silty soils on natural levees.

These soils are on flood plains and low natural levees of the Mississippi River and its tributaries. Slopes are dominantly 0 to 3% and undulating topography of ridges and swales is common. The Commerce family is on the flood plain and the Bruin family is on the natural levees. Other soils in this association are those of the Convent, Mhoon, Newellton, Robinsonville, and Tunica series.

Most soils in this association are used for tilled crops. When drained and protected from flooding, these soils are

well suited for all agricultural uses. Due to wetness, they have moderate limitations for most nonfarm uses.

E-2. Commerce family-Covent family association, flooded: Somewhat poorly drained silty soils on flood plains.

This association is on flood plains of the Mississippi River. Slopes range from 0 to 3 %. These areas flood frequently. Other soils in this association include those of the Bruin, Mhoon, and Robinsonville series.

Most areas are in mixed hardwood forest. If protected from flooding and drained, these soils are well suited for tilled crops and pastures. Flooding causes severe limitation for most nonfarm uses.

E-3. Commerce family-Dundee family association: Somewhat poorly drained silty soils on flood plains and natural levees.

These soils are on flood plains and natural levees of the Mississippi River and its tributaries. Slopes are nearly level or undulating with ridge and swale topography. The gradient ranges from 0 to 3%. The Commerce family is on the flood plains and the Dundee family is on the natural levees. Other soils in this association are those in the Amagon and Sharkey series.

Most soils of this association are used for tilled crops. These soils are well suited for tilled crops, pastures, and woodland. Due to wetness, they have moderate to severe limitations for most nonfarm uses.

E-4. Commerce family-Mhoon family association: Somewhat poorly drained and poorly drained silty soils on flood plains.

These soils are on flood plains of the Mississippi River. Slopes are dominantly 0 to 1% but in undulating areas of ridge and swale topography, they range to 3%. The Commerce family is on the ridges and higher parts of the association nearest the stream channels; the Mhoon family is on the swales and depressional areas. Other soils in the association are in the Convent, Newellton, Tunica, and Sharkey series.

Soils in this association are used mainly for tilled crops. The Commerce family is well suited for most agricultural uses. The Mhoon family is fairly well suited. Due to wetness, limitations for most nonfarm uses are moderate to severe.

E-5. Commerce family-Robinsonville family association: Somewhat poorly drained silty soils and well drained loamy soils on flood plains.

This association is mainly on flood plains of the Mississippi River. Slopes are dominantly 0 to 1% but undulating areas of ridges and swales range to 5%. Commerce family is mainly on the broader flats and the Robinsonville soils are on the low loamy ridges adjacent to the stream channel. Other soils include those of the Convent, Crevasse, Mhoon, and Sharkey series.

Soils not protected by levees overflow freqeuntly and are mainly used for woodland. Where protected from overflow, these soils are well suited for agricultural uses. Due to flooding, they have severe limitations for most nonfarm uses; however, they have slight to moderate limitations when protected.

E-6. Commerce family-Sharkey family association: Somewhat poorly drained silty soils and poorly drained clayey soils on flood plains.

These soils are on flood plains of the Mississippi River and its tributaries, such as the White River. Slopes are dominantly 0 to 1% but in the undulating ridges and swales they range to 3%. Soils of the Commerce family are adjacent to the stream channels and those of the Sharkey family are in the slackwater areas. Other soils include those of the Bowdre, Mhoon, and Tunica series.

Most soils that are protected from flooding are used for tilled crops. Soils not protected are in mixed hardwood forests. These soils, if protected from flooding and drained, are suited for tilled crops and pastures. Wetness and also the very high shrink-swell potential of the Sharkey soils cause severe limitations for most nonfarm uses.

E-7. Falaya family-Collins family association: Somewhat poorly and moderately well drained silty soils on flood plains.

This association is on flood plains along streams which drain the silty uplands of the loessial ridges. Slopes are less than 2%. The Falaya family is on the lower wetter areas and the Collins family is on the higher areas. Other soils in this association include the Arkabutla, Cascilla, Commerce, Waverly, and Zachary series.

The principal use of these soils is for tilled crops. They are well suited for agricultural uses. Flooding causes severe limitations for most nonfarm uses. If protected from flooding, limitations are moderate.

E-8. Mhoon family-Portageville family association: Poorly drained silty soils and poorly drained clayey soils on flood plains.

These soils are on flood plains of the Mississippi River. Slopes are 1% or less. The association is in the northern part of the Southern Mississippi Valley. Other soils include the Commerce, Crevasse, Hayti, and Sharkey series.

Soils that have been drained are used for tilled crops. Undrained soils are in forests of cypress and mixed hardwoods. Due to wetness and also high shrink-swell for the Portageville series, they have severe limitations for most nonfarm uses.

E-9. Waverly family-Falaya family association: Poorly and somewhat poorly drained silty soils on flood plains.

This association is on flood plains along streams which drain the silty uplands of the loessial ridges. Slopes are dominantly less than 1%. The Waverly family is on the lower areas and the Falaya family is on the higher better drained areas. Other soils in this association include the Arkabutla, Cascilla, Collins, Rosebloom, and Zachary series.

Part of the soils are cleared and used for tilled crops and pastures, but most of the wetter undrained soils are in hardwood forests. Flooding and wetness of these soils cause severe limitations for most nonfarm uses.

E-10. Barbary family-Sharkey family association: Very poorly and poorly drained clayey soils in backswamp areas of the flood plains.

These soils are in the large backswamp areas of the lower Mississippi River flood plain. These soils are level with slopes of less than 1%. The Barbary family is on the lowest areas of the association where flooding is almost continuous. The Sharkey family is on the higher areas which are occasionally to frequently flooded. Other soils in this association are the Baldwin and Iberia series. Areas of marsh are also included.

Due to the long periods of saturation, these soils are used mainly for woodland and wildlife. If drained and protected from flooding, they would be fairly well suited for agricultural uses. Flooding, wetness, and very high shrink-swell potential make severe limitations for nonfarm uses.

E-11. Adler family-Morganfield family association: Moderately well and well drained silty soils on flood plains.

This association is in the flood plain of the tributaries that drain from the silty uplands. Slopes are dominantly 0 to 1%. The Morganfield soils are on higher better drained areas near the stream channels and the Adler soils are on the lower areas of the association. Other soils in this association are in the Collins and Vicksburg series.

These soils are used for tilled crops and pastures. They are some of the most productive soils in the area for tilled crops, pasture, and woodland. Flooding causes severe limitations for nonfarm uses. If protected from flooding and drained, they have slight to moderate limitations for nonfarm uses.

E-12. Norwood family-Buxin family association: Well drained silty soils and somewhat poorly drained clayey soils on flood plains.

This association is on flood plains mainly along the Red River. Slopes are dominantly 0 to 1%, but in undulating areas of ridge and swale topography, they range to 5% The Norwood family is along and adjacent to the stream channel. The Buxin family is in the depressed area further from the stream channels. Other soils in this association are the Baldwin and Iberia.

These soils are mostly cleared and used for tilled crops and pastures for which they are suited. Flooding and also very high shrink-swell potential of the Buxin soils cause severe limitations for nonfarm uses.

E-13. Robinsonville family-Commerce family association: Well drained loamy soils and somewhat poorly drained silty soils on flood plains.

These soils are on flood plains of the Mississippi River and its major tributaries. Slopes are dominantly 0 to 1% but in areas of ridge and swale undulation, they range to 5%. Soils of the Robinsonville family are usually in narrow bands or long ridges along the stream channels. The Commerce family is in the slightly depressed wetter areas adjacent to the Robinsonville family. Other soils in this association are the Adler, Bowdre, Convent, Morganfield, Sharkey, and Tunica.

Where protected from flooding, these soils are used for tilled crops, but where flooded, they are in mixed hardwood forest. Flooding causes severe limitations for most nonfarm uses. If protected from flooding, the limitations are slight to severe.

E-14. Crevasse family association, undulating: Excessively drained sandy soils on flood plains.

The Crevasse family is on flood plains in the upper part of the Southern Mississippi Valley. These areas are on ridge and swale topography. Slopes are 0 to 5%. Other soils in this association are those of the Beulah, Bosket, and Dubbs series.

These sandy soils are drouthy and poorly suited for tilled crops. They are used for pastures. They have slight limitations for most nonfarm uses. Rapid permeability causes severe limitations for sewage lagoons.

E-15. Crevasse family-Dundee family associations: Excessively drained sandy soils and somewhat poorly drained silty soils on natural levees.

This association is mainly in the upper part of the Southern Mississippi Valley. Slopes are dominantly 0 to 3%. Undulating ridge and swale topography is common. The Crevasse family is in the sandier, most undulating areas of the association. The Dundee family is on the flatter areas. Other soils in this association include those of the Amagon, Beulah, Bosket, and Dubbs series.

The soils in this association are used mainly for cultivated crops, with small acreages in mixed hardwood forests. The Crevasse soils are drouthy and poorly suited for tilled crops. Dundee soils are well suited. Limitations for nonfarm uses are slight to severe.

E-16. Crevasse family-Robinsonville family association, undulating: Excessively drained sandy soils and well drained loamy soils on flood plains.

These soils are on the flood plains of the Mississippi River and its major tributaries. This association is not protected by levees and is dissected by sloughs, meander, and flood scour scars. Slopes are dominantly 0 to 3%. The Crevasse family is along the banks of the present and former channels. The Robinsonville family is adjacent to the Crevasse family but on the more stable surfaces. Other soils in this association include those of the Adler, Commerce, Mhoon, Morganfield, and Sharkey series.

The soils in this association are used mainly for woodland or mixed hardwood because of the flooding hazard. Due to flooding, they have severe limitations for nonfarm uses.

I-1. Alligator family association: Poorly drained clayey soils in backswamp areas of the flood plain.

This association is on wide flood plains. Slopes are 0 to 3%. Some areas are undulating with irregular ridge and swale topography. Other soils in this association are those of the Amagon, Dundee, Earlé, and Forestdale series.

The principal use of this association is tilled crops for which the soils are fairly well suited. These soils have very high shrink-swell potential and wetness that severely limit most nonfarm uses.

I-2. Alligator family-Forestdale family association: Poorly drained clayey soils on flood plains and low natural levees.

This association is on flood plains and natural levees of the Mississippi River and its tributaries. Slopes are dominantly 0 to 3% and an undulating topography of irregular ridges and swales is common. The Alligator family is on the lower flood plains and the Forestdale family is on the natural levees. Other soils in this association are those of the Amagon, Dundee, and Earle series.

Most of the soils in this association that are protected from flooding by levees are used for tilled crops. Soils not protected are in mixed hardwood forests. The high to very high shrink-swell potential and wetness of these soils cause severe limitations for most nonfarm uses.

I-3. Sharkey family association: Poorly drained clayey soils in backswamp areas of the floor plains.

The Sharkey family is on broad flood plains of the Mississippi River. Most of these areas are protected by levees from flooding. Slopes are dominantly less than 1% but range to 3% in the ridge and swale areas. Other soils are in the Bowdre, Commerce, Iberia, Mhoon, Newellton, and Tunica series.

This association has many limitations for use. The soils, when drained, are well suited for pastures and fairly well suited for tilled crops and forests. The very high shrink-swell potential and wetness cause severe limitations for most nonfarm uses.

I-4. Sharkey family association, flooded: Poorly drained clayey soils in backswamp areas of the flood plains.

This association is on broad flood plains of the Mississippi River. These flood plains are not protected by

levees and are largely along the floodways of the lower Mississippi River. Other soils in the association include the Commerce, Iberia, Mhoon, Newellton, and Tunica series.

The principal use of soils in this association is for mixed hardwood forests. With proper flood-protection and drainage, these soils are fairly well to well suited for tilled crops and pastures. Due to flooding and very high shrink-swell potential, they have severe limitations for most nonfarm uses.

I-5. Sharkey family-Alligator family association: Poorly drained clayey soils in backswamp areas of the flood plains.

This association is on flood plains of the Mississippi and Red Rivers. Slopes are dominantly less than 1%. The Sharkey family is on the lower backswamps and the Alligator family is on the higher areas. Other soils in this association include the Buxin, Hebert, Portland, and Rilla in the Red River flood plain and the Commerce, Mhoon, Newellton, and Tunica in the Mississippi flood plains.

Soils protected from flooding are used for tilled crops for which they are fairly well suited. Soils not protected are mainly in mixed hardwood forests. Wetness and very high shrink-swell cause severe limitations for most nonfarm uses.

I-6. Sharkey family-Bowdre family association: Poorly drained clayey soils and somewhat poorly drained clayey over loamy soils on flood plains.

These soils are on flood plains of the upper Southern Mississippi Valley Alluvium. Slopes are dominantly less than 1%. The Sharkey family is on areas of the backswamp where clay deposits are thick. The Bowdre family is on areas where the deposits of clay are thin over loamy materials. Other soils in this association include the Commerce, Mhoon, Newellton, and Tunica series.

Most soils of this association are used for tilled crops for which they are fairly well suited. Due to shrink-swell potential and wetness, these soils have severe limitations for most nonfarm uses.

I-7. Sharkey family-Commerce family association: Poorly drained clayey soils and somewhat poorly drained silty soils on flood plains.

This association is on flood plains of the Mississippi River. Slopes are dominantly 0 to 1%. The Sharkey family is on the backswamp areas and the Commerce family is on the low ridges along the stream channels. Other soils in this association include the Adler, Crevasse, Mhoon, Morganfield, Newellton, and Tunica series.

Most of these soils are in mixed hardwood timber, but soils that are protected from flooding are used for tilled crops. Due to wetness and also the very high shrink-swell potential of the Sharkey soils, limitations are moderate to severe for most nonfarm uses.

I-8. Sharkey family-Crevasse family association, undulating: Poorly drained clayey soils and excessively drained sandy soils on flood plains.

This association is on broad backswamp areas of the Mississippi River flood plains in northeast Arkansas and southeast Missouri. Slopes are 0 to 3%. The Sharkey family is on the flats and the Crevasse family is on the low ridges. Other soils in the association include Amagon, Dundee, and Tunica.

Most soils of this association are used for tilled crops. The Crevasse soils are drouthy and poorly suited for tilled crops. The Sharkey soils have wetness and very high shrink-swell potential that cause severe limitations for most nonfarm uses. Crevasse soils have slight limitations for most nonfarm uses except for sewage lagoons. Rapid permeability causes severe limitations for this use.

I-9. Sharkey family-Desha family association: Poorly drained clayey soils in backswamp areas of the flood plains.

This association is on nearly level flood plains in the lower Arkansas River Valley. Slopes are mainly 0 to 1%. Soils of the Sharkey family are on the lower areas mainly below the junction of the Arkansas and Mississippi Rivers. Soils of the Desha family are on the higher areas. Other soils in this association include Commerce, Hebert, Perry, Portland, and Rilla.

Most soils of this association are cleared and used for tilled crops and pastures for which they are fairly well to well suited. These soils have very high shrink-swell potential and seasonal wetness which cause severe limitations for most nonfarm uses.

I-10. Sharkey family-Portland family association: Poorly and somewhat poorly drained clayey soils in backswamp areas of the flood plains.

These soils are on flood plains of the Arkansas River and its former channels. Slopes are dominantly 0 to 1%. Soils of the Sharkey family are on the lower areas and those of the Portland family are on the higher better drained areas. Other soils in this association are the Buxin, Desha, Hebert, Moreland, and Rilla series.

Most of these soils are cleared and used for tilled crops. They are fairly well to well suited for crops and pastures. Wetness and very high shrink-swell potential cause severe limitations for most nonfarm uses.

I-11. Sharkey family-Tunica family association: Poorly drained clayey soils and clayey over loamy soils on flood plains.

This association is on backswamp flood plains of the Mississippi River. Slopes are dominantly 0 to 1%. The Sharkey family is in areas of thick clay deposits and the Tunica family is in areas of moderately thick clay over loamy deposits. Other soils in the association include the Bowdre, Commerce, Mhoon, and Newellton series.

Most soils of the association are cleared and used for tilled crops for which they are fairly well suited. Wetness and high to very high shrink-swell potential cause severe limitations for most nonfarm uses.

I-12. Una family association: Poorly drained clayey soils on flood plains.

These soils are on flood plains of the Ouachita River. Slopes are dominantly 0 to 1% but range to 4%. Other soils in the association include the Alligator, Guyton, and Rosebloom series.

Most of the soils of this association are used for woodland or pasture. If cleared and drained, they are fairly well suited for tilled crops and pastures. Flooding and wetness cause severe limitations for most nonfarm uses.

I-13. Beulah family-Crevasse family association: Well drained loamy soils and excessively drained sandy soils on natural levees.

This association is on natural levees along old stream channels, bayous, and oxbow lakes. Slopes are nearly level to sloping and undulating with gradients of 0 to 8%. Other soils in this association include the Amagon, Bosket, Dubbs, and Dundee series.

Most of the soils are cleared and used for tilled crops. The Beulah soils are fairly well suited for tilled crops. Crevasse soils are drouthy and poorly suited. Limitations are slight for most nonfarm uses except that, due to rapid

permeability, Crevasse soils have severe limitations for sewage lagoons.

M-1. Iberia family-Baldwin family association: Poorly drained clayey soils on natural levees.

These soils are on natural levees in the southern part of the Mississippi Valley. These are nearly level soils with slopes of 0 to 1%. The Iberia family is in the depressed areas and the Baldwin family is on the slightly higher elevations. Other soils include the Sharkey series.

Most soils are cleared and used for tilled crops for which they are fairly well suited. The very high shrink-swell potential and wetness of these soils make severe limitations for most nonfarm uses.

M-2. Iberia family-Sharkey family association: Poorly drained clayey soils on natural levees and backswamp areas of the flood plain.

These soils are on natural levees and backswamps along the Mississippi River and the Red River tributaries. Slopes are 0 to 1%. The Iberia family is on the natural levees and the Sharkey family is on the backswamps. Other soils include the Baldwin, Caspiana, Jeanerette, Reelfoot, and Tiptonville series.

Most soils in this association are cleared and in tilled crops. Wetness and very high shrink-swell potential of these soils cause severe limitations for most non-farm uses.

M-3. Reelfoot family-Tiptonville family association: Somewhat poorly and moderately well drained silty soils on natural levees.

These soils are on natural levees of the Mississippi River. Slopes are nearly level or gently sloping with gradients of 0 to 3%. The Reelfoot family is on the lower and flatter areas and the Tiptonville family is on the higher, better drained areas. Other soils include the Bowdre, Commerce, Robinsonville, Sharkey, and Tunica series.

Most soils in this association are cleared and used for tilled crops, for which they are well suited. These soils have moderate limitations for most nonfarm uses.

M-4. Buxin family association: Somewhat poorly drained clayey soils on flood plains.

This association is on nearly level flood plains of the Red River. Slopes are 0 to 1%. Other soils included are in the Caspiana, Gallion, Moreland, Perry and Portland series.

Most soils are cleared and used for pasture or tilled crops. They are fairly well to well suited for these uses. Due to very high shrink-swell potential, limitations are severe for most nonfarm uses.

M-5. Buxin family-Portland family association: Somewhat poorly drained clayey soils on flood plains.

These soils are on flood plains of the Arkansas River. Slopes are dominantly 0 to 1%. Other soils include Caspiana, Desha, Hebert, Perry, and Rilla.

Most soils of this association are cleared and used for tilled crops for which they are fairly well suited. They have very high shrink-swell potential which causes severe limitations for most nonfarm uses.

X-1. Marsh:

This miscellaneous land type includes marshes and swamps in the southern part of the Mississippi Valley. Recent efforts to classify the soils there indicate they are dominantly Histosols and Hydraquents.

The Histosols are organic soils in which water stands on or at the surface most of the year unless artificially drained. The water is fresh unless affected by tides, in which case it is brackish or saline. Vegetation in marshy areas is primarily water-loving or water-tolerant reeds and grasses.

The Hydraquents are mineral soils on which water stands on or at the surface most of the time unless artificially drained. For the most part, the water is fresh but, as in Histosols, it may be brackish or saline if affected by tides. Due largely to their constant wetness, these soils remain soft and mucky, and trafficability is limited. For the most part, the Hydraquents support water-tolerant shrubs and trees which, in some areas, are merchantable. A few of the Hydraquents support water-tolerant reeds and grasses.

The undrained Histosols and Hydraquents are used primarily for wildlife. A few are used for timber production and, where suitable access is provided, some of the coastal marshes are used for grazing. Drained areas are used for tilled crops and pastures. Near major cities, some have been used for urban development.

Development of these soils for agricultural and urban usage faces difficult problems. When drained and protected from flooding, the Histosols tend to subside rather rapidly unless precise water table controls are practiced. Special foundations are needed to stabilize houses and other structures. The Hydraquents subside to some extent and tend to form large cracks that remain open permanently. These risks must be taken into consideration when developing for either agricultural or urban usage.

The following definitions were used for the interpretations in Table 6:

Flood hazard
- **Slight:** Floods less often than once in 5 years.
- **Moderate:** Floods once in 5 years.
- **Severe:** Floods more often than once in 5 years.

Shrink-swell potential
- **Low:** These soils have a coefficient of linear extensibility of less than .03.
- **Moderate:** These soils have a coefficient of linear extensibility of .03 to .06.
- **High:** These soils have a coefficient of linear extensibility between .06 and .09.
- **Very high:** These soils have a coefficient of linear extensibility of over .09.

Suitability for tilled crops
- **Well:** Soils with few or moderate limitations in the choice of plants, that require no more than moderate management practices for continuous intensive use. Soils of high productivity. (Capability classes I and II.)
- **Fair:** Soils with severe limitations that reduce the choice of plants, require intensive management, or both. Soils of high through low productivity. (Frequently flooded areas requiring group activity with high expenditure to protect and those in Capability classes III or IV are in this class.)
- **Poor:** Soils with very severe limitations for plants. Productivity is high to very low. (Frequently flooded, sandy drouthy soils, and soils with high sodium are included. Capability classes IV and V are in this class.)

Suitability for woodland
- **Well:** Soils in productivity classes 1 or 2, with no soil-related severe management limitations.
- **Fair:** Soils in productivity classes 1 or 2 with severe management limitations, or in productivity class 3.
- **Poor:** Soils in productivity class 5.

Suitability for pasture

Well: Produces 6 animal unit months or more yield for one or more of the commonly used pasture grasses, with no severe physical limits (such as frequent flooding) in herd care management.

Fair: Produces 4 to 6 animal unit months yield, or over 6 animal unit months with severe limits in herd care (mainly frequent flooding requiring frequent herd removal).

Poor: Less than 4 animal unit months yield.

Limitations for

Roads and streets

Slight: No limitations.

Moderate: Has one or more of the following: somewhat poorly drained soil, flood once in 5 years, or have moderate shrink-swell potential.

Severe: Has one or more of the following: poorly drained soils, flood more often than once in 5 years, or shrink-swell potential is high or very high.

Buildings

Slight: No limitations.

Moderate: One or more of the following apply: somewhat poorly drained soils, seasonal water table below 2 feet, have no flooding and moderate shrink-swell potential.

Severe: One or more of the following apply: poorly drained soils, seasonal water table at depths of less than 2 feet, subject to flooding, or have high or very high shrink-swell potential.

Sewage lagoons

Slight: No limitations and permeability is less than .63 inch per hour.

Moderate: Moderate permeability or has slopes of 2 to 7 percent.

Severe: Moderately rapid to rapid permeability, has slopes of over 7 percent, or has moderate to severe flooding.

Septic tank absorption fields

Slight: No limitations.

Moderate: One or more of the following apply: lower end of moderate permeability (0.63 to 1 inch per hour), seasonal water table is at 2 to 4 feet, does not flood more often than once in 5 years.

Severe: One or more of the following apply: permeability less than 0.63 inch per hour, depth to seasonal water table is less than 2 feet, floods more often than once in 5 years.

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APPENDIX

Supplemental Soil Series;

Descriptions and Analytical Data

UNDESIGNATED SERIES
(sampled as Alligator Silty Clay)

Location: Phillips Co., Ark., 0.7 mi north of intersection of Hw 44 and 85 on west side of road

Pedon No.: 7

Classification: Vertic Haplaquepts, fine, mixed, nonacid, thermic

Slope: Nearly level

Drainage: Poorly drained

Samples collected by: D. A. Brown and J. V. Pettiet

On: March 18, 1958

Morphological description by: James Gray and Marvin Lawson

Hor.	Depth	
Ap	0-5"	Dark grayish brown (10YR 4/2) silty clay; weak fine subangular blocky structure; friable; few fine dark concretions; many roots and few pores; strongly acid; abrupt smooth boundary.
B1g	5-13"	Light brownish gray (10YR 6/2) silty clay with many coarse distinct brown (10YR 4/3) and few medium distinct yellowish brown mottles; weak medium subangular blocky structure; firm; common fine dark concretions; pressure faces on the peds; common roots and pores; very strongly acid; clear wavy boundary.
B21g	13-20"	Light brownish gray (10YR 6/2) silty clay with common medium distinct dark brown (10YR 4/3) mottles; firm; very plastic; moderate fine subangular blocky structure; many coarse hard concretions; pressure faces on the peds; few roots and pores; strongly acid; gradual wavy boundary.
B22g	20-29"	Light brownish gray (10YR 6/2) silty clay to clay with many medium to coarse distinct yellowish brown (10YR 5/6) mottles; strong coarse angular blocky structure; firm; very plastic; many fine hard concretions; pressure faces on peds; few roots and pores; strongly acid; clear wavy boundary.
B23g	29-38"	Light brownish gray (10YR 6/2) silty clay with common distinct yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; very plastic; many fine to coarse dark concretions; pressure faces on peds; few roots and pores; medium acid; gradual wavy boundary.
Cg	38-50+"	Light brownish gray (10YR 6/2) silty clay with many medium distinct yellowish brown (10YR 5/8) mottles; firm, very plastic; weak medium subangular blocky structure; many fine to coarse dark concretions; pressure faces on peds; few roots and pores; neutral.

Appendix Table 1.

Soil Series Alligator, silty clay Location Phillips Co., Arkansas

Pedon No. 7 Laboratory No. 57-61A

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap	0- 5	2.2				56.2	21.6	20.0	41.6	sic
B1g	5-13	2.0				56.5	19.6	22.0	41.6	sic
B21g	13-20	1.4				49.9	21.5	27.0	48.5	sic
B22g	20-29	0.8				47.6			51.6	sic
B23g	29-38	0.6				51.4	16.4	31.6	48.0	sic
Cg	38-50+	1.8				50.4	18.2	29.6	47.8	sic

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P lb/A
Ap	1.48	5.1		17.40	6.22	3.96	.76	.95	5.51	68	65
B1g	0.56	4.7		17.95	5.56	4.36	.72	.68	6.63	63	38
B21g	0.30	4.9		23.73	5.49	8.53	1.33	1.10	7.28	69	32
B22g	0.35	5.0		27.59	5.60	11.95	1.96	1.69	6.39	77	26
B23g	0.31	5.5		24.68	7.10	11.50	2.35	1.60	2.13	91	22
Cg	0.20	6.7		21.22	6.29	10.53	2.65	2.05	-	101	20

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Density	Porosity %
Ap		24.1					10.4	0.21	1.51	43
B1g		24.2					11.3	0.19	1.48	44
B21g		27.4					15.3	0.18	1.46	45
B22g		40.1					17.7	0.34	1.54	42
B23g		35.2					16.9	0.28	1.54	42
Cg		31.9					15.3	-	-	

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap	Q1 K3 I3 PF3 KF3	Q2 M2 K3 I3	M2 I2 K3 V3	M1 A2
B1g	Q1 K3 I3 PF3 KF3	Q2 M2 I2 K3	M2 I2 V3	M1 A2
B21g	Q1 K3 I3 PF3 KF3	I2 M2 Q3 K3	M1 I2 K3	M1 A2
B22g	Q1 K3 I3 PF3 KF3	----	M1 I2 K3 Q3	M1 A2
B23g	Q1 K3 I3 PF3 KF3	I2 M2 K2 Q3	M1 I2 K3 Q3	M1 A2
Cg	Q1 K3 I3 PF3 KF3	I2 M2 Q3 K3	M2 I2 Q3 K3	M1 A2

* Values for disturbed cores.

UNDESIGNATED SERIES
(sampled as Alligator Silt Loam)

Location: Phillips Co., Ark., 400 yd SW of Morton's General Store, Hw 44, north side

Pedon No.: 8

Classification: Aeric, Ochraqualfs, thermic, fine, montmorillonitic, thermic

Slope: Nearly level

Drainage: Moderate to poorly drained

Samples collected by: D. A. Brown and J. V. Pettiet

On: March 18, 1958

Morphological description by: James Gray and Marvin Lawson

Hor.	Depth	
Ap	0-6"	Grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; common roots and pores; medium acid; abrupt smooth boundary.
B21tg	6-12"	Grayish brown (10YR 5/2) silty clay; with few medium distinct yellowish brown mottles; moderate fine to medium subangular blocky structure; firm; few fine dark concretions; common roots and pores; strongly acid; clear wavy boundary.
B22tg	12-23"	Grayish brown (10YR 5/2) silty clay with common coarse distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure firm; few fine concretions; pressure faces common; few roots and common pores; strongly acid; clear wavy boundary.
B23tg	23-34"	Grayish brown (10YR 5/2) silty clay with many coarse distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm: common fine concretions; common pressure faces; few roots and pores; strongly acid; clear wavy boundary.
B24tg	34-45"	Grayish brown (10YR 5/2) silty clay with many coarse distinct yellowish brown (10YR 5/4) mottles; strong fine to medium subangular blocky structure; firm; common fine concretions; few roots and pores; strongly acid; clear wavy boundary.
B3g	45-50+"	Grayish brown (10YR 5/2) silty clay loam with many coarse distinct yellowish brown (10YR 5/4) mottles; weak fine to coarse subangular blocky structure; friable to firm; few fine dark concretions; few roots and pores; strongly acid.

Appendix Table 2.

Soil Series Alligator silt loam Location Phillips Co., Arkansas

Pedon No. 8 Laboratory No. 67-72

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap	0- 6	28.5				54.5	5.9	11.2	17.1	sil
B21tg	6-12	13.3				46.0	12.6	28.1	40.7	sic
B22tg	12-23	5.0				45.3	13.6	36.1	49.7	sic
B23tg	23-34	2.6				56.9	12.0	28.3	40.3	sicl
B24tg	34-45	0.6				45.5	20.5	33.4	53.9	sic
B3g	45-50+	3.1				65.4	10.3	21.3	31.6	sicl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.83	5.6		9.10	3.31	1.78	.70	1.12	2.19	76	60
B21tg	0.39	5.3		21.95	8.58	4.55	.15	.60	8.07	63	35
B22tg	0.31	5.0		28.69	11.53	6.92	.32	.75	9.17	68	32
B23tg	0.25	5.2		22.46	9.05	7.86	.83	.46	4.26	81	25
B24tg	0.32	5.0		29.29	13.80	10.08	.51	1.10	3.80	87	22
B3g	0.27	5.1		18.93	7.71	5.62	.40	.72	4.48	76	20

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15 *	Avail. Water In./In.	Bulk Density	Porosity %
Ap		13.0					4.7	0.13	1.51	43
B21tg		24.3					13.4	0.17	1.53	42
B22tg		28.0					16.9	0.17	1.51	43
B23tg		26.8					13.6	0.08	1.58	40
B24tg		38.5					21.5	0.25	1.47	45
B3g		24.0					10.6	-	-	-

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap	Q1 K3 I3 PF3 KF3	I2 M2 K3 Q3	M1 I2 Q3	M1 A2
B21tg	Q1 K3 I3 PF3 KF3	M1 I2 K3 Q3	M1 I2 Q3	M1 A2
B22tg	Q1 K3 I3 PF3 KF3	M2 I2 Q3 K3	M1 I2 Q3	M1 A2
B23tg	Q1 K3 I3 PF3 KF3	I2 M2 K3 Q3 V3	M1 I2	M1 A2
B24tg	Q1 K3 I3 PF3 KF3	M2 I2 Q2 K3	M1 I2 K3 Q3	M1 A2
B3g	Q1 K3 I3 PF3 KF3	M1 I2 K3 Q3	M1 I2 K3	M1 A2

* Values for disturbed cores.

CREVASSE LOAMY FINE SAND

Location: Mississippi Co., Ark., 2.5 mi west, 1/4 mi north, 1/8 mi east of Buckeye

Pedon No.: 9

Classification: Typic Udipsamments, mixed, thermic

Slope: 0 to 3 percent

Drainage: Well drained

Samples Collected by: D. A. Brown & J. V. Pettiet

On: March 20, 1958

Morphological description by: Marvin Lawson

Hor.	Depth	
Ap1	0-8"	Dark brown (10YR 3/3) loamy fine sand; weak fine granular structure; very friable; common roots and pores; medium acid; abrupt smooth boundary.
Ap2	8-12"	Dark brown (10YR 4/3) light fine sandy loam to loamy sand with many coarse distinct very dark brown splotches; weak fine granular structure; very friable; common roots and pores; medium acid; abrupt wavy boundary.
C1	12-29"	Yellowish brown (10YR 5/6) loamy sand with many coarse distinct very dark grayish brown (10YR 3/2) and common coarse distinct grayish brown (10YR 5/2) splotches; structureless; very friable; few roots and common pores; strongly acid; clear wavy boundary.
C2	29-46"	Yellowish brown (10YR 5/6) light sandy loam with common coarsedistinct very dark grayish brown and grayish brown splotches; structureless; very friable; few roots and common pores; strongly acid; diffuse boundary.
C3	46-52+"	Yellowish brown (10YR 5/4) loamy fine sand with common coarse distinct grayish brown splotches; structureless; loose; strongly acid.

Appendix Table 3.

Soil Series Crevasse loamy fine sand Location Mississippi Co., Ark.

Pedon No. 9 Laboratory No. 118-122

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap1	0- 8	85.7				1.82	5.3	7.2	12.5	lfs
Ap2	8-12	78.8				5.3	6.3	9.7	16.0	sl
B21	12-29	80.9				6.5	-	-	12.6	sl
B22	29-46	81.2				1.0	6.2	11.6	17.8	sl
C	46-52	88.8				1.2	4.8	5.2	10.0	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P lb/A.
Ap1	0.87	5.4		5.64	1.34	1.14	0.21	0.20	2.75	51	80
Ap2	0.52	5.4		5.56	1.51	1.16	0.15	0.17	2.57	54	45
B21	0.29	5.1		4.66	1.14	0.96	0.12	0.21	2.23	52	40
B22	0.16	4.9		4.99	0.86	1.00	0.29	0.14	3.60	46	20
C	0.11	5.6		3.96	1.02	1.49	0.33	0.14	0.98	75	15

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15 *	Avail. Water In./In.	Bulk Density	Porosity %
Ap1		5.3					2.3	0.05	1.58	37.7
Ap2		6.4					3.0	0.06	1.62	47.8
B21		6.1					2.7	0.05	1.53	46.9
B22		5.7					2.8	0.04	1.44	43.4
C		4.2					2.1	0.03	1.56	50.1

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap1		I1 Q2 M2 K3	M1 Cl_2 I3	M1 A3
Ap2		I1 Q2 M2 K3	M1 I3 K3	M1 A3
B21		----	M1 I2 K3	M1 A3
B22		M2 I2 Q3 K3	M1 I2 K3	M1 A3
C		I1 M2 Q3 K3	M1 I2 Cl_3 K3	M1 A3

* Values for disturbed samples.

UNDESIGNATED SERIES
(sampled as Dubbs fine sandy loam)

Location: Mississippi Co., Ark., 1 1/2 mi north, 5/8 mi east of Buckeye on north side of road

Pedon No.: 10

Classification: Uitic Hapludalfs, fine-silty, mixed, thermic

Slope: Gently sloping, 2 percent Drainage: Moderate to well drained

Samples collected by: D. A. Brown, J. V. Pettiet, & James Gray
On: March 18, 1958

Morphological description by: James Gray and Marvin Lawson

Hor.	Depth	
Ap1	0-6"	Dark grayish brown (10YR 4/2) fine sandy loam, weak fine granular structure; very friable; many roots and pores; strongly acid; abrupt smooth boundary.
Ap2	6-9"	Dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; friable; many roots and pores; strongly acid; abrupt wavy boundary.
B1	9-24"	Dark brown (10YR 4/3) loam; weak coarse subangular blocky structure; friable; many roots and pores; patchy clay films; medium acid; clear wavy boundary.
B21t	24-34"	Dark yellowish brown (10YR 4/4) loam with gray silt coatings on root holes and crack fills; moderate coarse subangular blocky structure; firm; clay skins on peds; common roots and many pores; medium acid; diffuse boundary.
B22t	34-52"	Dark brown (10YR 4/3) sandy clay loam with light brownish gray silt pockets and coatings; moderate coarse subangular blocky structure; firm; few fine to medium concretions and splotches; clay skins on peds; few roots and common pores; medium acid; abrupt wavy boundary.
II C	52+"	Yellowish brown (10YR 5/4) loose sandy loam; structureless; medium acid.

Appendix Table 4.

Soil Series Dubbs Fine Sandy loam Location Mississippi Co., Arkansas

Pedon No. 10 Laboratory No. 107-111

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap1	0- 6	57.9				30.4	4.5	7.2	11.7	sl
Ap2	6- 9	53.4				32.7	4.5	9.4	13.9	sl
B1	9-24	43.3				42.1	6.1	8.5	14.6	l
B21t	24-34	28.4				48.3	10.8	12.5	23.3	l
B22t	34-52	48.6				28.7	8.0	14.7	22.7	scl
IIC	52+	-				-	-	-	-	

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap1	0.78	5.4		4.86	1.52	0.36	0.18	0.29	2.51	48	78
Ap2	0.70	5.3		4.94	1.56	0.73	0.23	0.18	2.24	55	38
B1	0.37	5.7		4.12	1.50	0.89	0.23	0.18	1.32	68	34
B21t	0.38	5.8		14.40	4.70	2.81	0.23	0.21	6.45	55	40
B22t	0.29	4.6		13.20	2.82	1.69	0.22	0.16	8.31	37	38

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Density	Porosity %
Ap1		7.1					2.5	0.07	1.57	41
Ap2		7.8					2.7	0.08	1.61	39
B1		10.2					2.6	0.11	1.46	45
B21t		18.9					8.9	0.16	1.62	39
B22t		16.8					7.4	0.14	1.50	43

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap1	Q1 PF3 KF3 I3	I2 Q2 K3 M3	M1 I2	M1 A2
Ap2	Q1 PF3 KF3 I3	Q2 M2 K3 I3	M1 Q3 I3	M1 A2
B1	Q1 PF3 KF3 I3	I1 Q2 K3 M3	M1 I3 V3	M1 A2
B21t	Q1 PF3 KF3 I3	I2 M2 Q3 V3 K3	M1 I2 K3	M1 A2
B22t	Q1 PF3 KF3 I3	M1 I2 K3 Q3	M1 I2 K3	M1 A2

* Values for disturbed samples.

DUBBS LOAM

Location: Crittenden County, Ark., 3/4 mi east of Frisco Railroad crossing at Clarkedale

Pedon No.: 11

Classification: Typic Hapludalfs, fine-silty, mixed, thermic

Slope: Gently sloping, 0 to 3 percent   Drainage: Moderately to well drained

Samples collected by: D. A. Brown and J. V. Pettiet

On: March 19, 1958

Morphological description by: James Gray and Marvin Lawson

Hor.	Depth	
Ap	0-4"	Grayish brown (10YR 5/2) loam; weak fine granular structure; friable; many roots and pores; strongly acid; clear smooth boundary.
B21t	4-9"	Dark brown (10YR 4/3) sandy clay loam; weak medium subangular blocky structure; friable; clay skins on the peds; many roots and pores; strongly acid; clear wavy boundary.
B22t	9-24"	Yellowish brown (10YR 5/4) loam; weak to moderate medium subangular blocky structure; friable; clay skins on peds; common roots and pores; very strongly acid; clear wavy boundary.
B3t	24-37"	Yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; common roots and pores; strongly acid; gradual wavy boundary.
II C	37-50+"	Light brownish gray (10YR 6/2) loamy sand; structureless; loose; few roots and pores; strongly acid.

Appendix Table 5.

Soil Series Dubbs loam — Location Crittenden Co. Arkansas

Pedon No. 11 — Laboratory No. 91-95

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 4	49.2				34.7	3.8	12.3	16.1	l
B21t	4- 9	50.8				26.6	5.6	17.0	22.6	scl
B22t	9-24	40.6				39.0	6.6	13.8	20.4	l
B3t	24-37	52.9				30.9	6.6	9.6	16.2	sl
IIC	37-50+	80.1				9.0	4.4	6.5	10.9	ls

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	1.18	5.0		8.84	2.50	1.19	.23	.40	4.50	49	82
B21t	0.84	5.1		16.26	4.76	2.03	.24	.28	8.95	45	45
B22t	0.38	4.8		12.71	3.96	2.02	.27	.22	6.24	51	42
B3t	0.25	5.1		9.66	3.25	1.81	.24	.23	4.13	57	38
IIC	0.24	5.5		6.92	2.63	1.23	.23	.25	2.58	63	32

Exchangeable Cations me/100g.: Ca, Mg, Na, K, H

MOISTURE AND BULK DENSITY DATA

Horizon	0	1/3	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Density	Porosity %
Ap		11.3					4.5	0.10	1.50	43
B21t		14.5					8.0	0.10	1.56	41
B22t		13.0					6.5	0.09	1.38	48
B3t		9.5					4.8	0.07	1.40	47
IIC		6.2					3.2	0.04	1.45	45

% Water retained at specified tension (Bar): columns 0 through 15*

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap	Q1 KF3 PF3 I3	I1 M2 Q3 K3	M1 I3 K3	M1 A2
B21t	Q1 KF3 PF3 I3	I1 M2 C13 Q3 K3	M1 I2 K3	M1 A2
B22t	Q1 KF3 PF3 I3	I1 V2 M3 K3 Q3	M1 I3 K3 Q3	M1 A2
B3t	Q1 KF3 PF3 I3	M1 I2 Q2 K3	M1 I2 C12 K3	M1 A2
IIC	Q1 KF3 PF3 I3	I1 M2 K3 Q3	M1 I2 C13 Q3	M1 A2

* Values for disturbed samples.

UNDESIGNATED SERIES

(sampled as Dubbs loamy fine sand)

Location: Jackson County, Ark., 1/2 mile west of Hw 67 at overpass north of Newport, SW 1/4, NE 1/4, Sec. 24
T12N, R3W, Photo IF-3N-63

Pedon No.: 12

Classification: Mollic Hapludalfs, fine-loamy, mixed, thermic

Slope: 1 to 3 percent

Drainage: Well drained

Samples collected by: M. E. Horn, D. A. Brown, & R. E. Phillips

On: November 16, 1961

Morphological description by: Marvin Lawson

Hor.	Depth	
Ap	0-6"	Dark brown (7.5YR 4/4) loamy fine sand; weak medium granular structure; very friable; common roots; medium acid; abrupt smooth boundary; parellel to tillage direction.
A3	6-14"	Dark brown (7.5YR 4/4) fine sandy loam; weak medium granular structure; very friable; common roots; medium acid; clear smooth boundary.
B2t	14-23"	Brown (7.5YR 5/4) sandy clay loam; moderate medium subangular blocky structure; firm; few roots; thin patchy clay films, common medium pores; few iron oxide coatings; common very fine black concretions; strongly acid; clear smooth boundary.
B3	23-41"	Dark brown (10YR 4/3) sandy loam; weak medium subangular blocky structure; friable; few fine roots; sand grains coated and bridged with clay; few fine black concretions; strongly acid; clear wavy boundary.
C	41-52+"	Dark yellowish brown (10YR 4/4) loamy fine sand; massive; single grain; very friable; strongly acid.

Remarks: Colors given are for moist soil. Soil was moist when sampled. James E. Hoelscher and George Dalke assisted with descriptive information.

Appendix Table 6.

Soil Series Dubbs Loamy fine sand Location Jackson Co., Arkansas

Pedon No. 12 Laboratory No. 182-186

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 6	84.2	5.01	6.28	1.71	13.0			2.8	ls
A3	6-14	78.9	2.30	2.45	3.14	7.9			13.2	sl
B2t	14-23	68.0	2.06	3.57	0.57	6.2			25.8	scl
B2	23-41	72.9	6.47	1.60	2.73	10.8			16.3	sl
C	41-52+	84.9	5.84	1.14	0.81	7.8			7.3	ls

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.65	6.0	4.5	3.62	1.51	0.66	0.61	0.41	0.43	100	-
A3	0.27	5.9	4.3	3.03	1.03	1.00	0.79	0.31	-	103	-
B2t	0.59	5.1	3.5	8.34	4.12	2.03	1.25	0.42	0.42	100	-
B 2	0.27	5.1	4.5	5.19	2.85	1.83	0.97	0.26	-	114	-
C	0.00	5.0	4.3	4.87	2.72	1.33	1.05	0.16	-	108	-

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	26.5	8.8	7.4	3.9	2.9	2.4	1.7	0.11	1.50	43
A3	24.6	11.2	9.4	7.4	6.1	5.0	4.3	0.11	1.59	40
B2t	27.7	20.2	18.6	13.6	11.4	10.2	8.6	0.18	1.55	41
B 2		11.9		8.8	7.7	6.7	5.8	0.09	1.53	42
C		7.2		5.1	4.0	3.5	2.7	0.07	1.51	43

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap				
A3				
B2t	Q1 K3 I3 KF3 PF3	I1 M2 V3 O3	I1 M2	M1 A3
B 2				
C	Q1 K3 I3 KF3 PF3	I1 M2 V3 O3	I1 M2	M1 A3

* Values for non-disturbed cores; all other values are for disturbed samples.

DUNDEE LOAM

Location: Mississippi Co., Ark., on Hw 77 at Ark.-Mo. state line, 2 miles west of Craighead County line; 1/4 mile south, 400 feet east of road

Pedon No.: 13

Classification: Aeric Ochraqualfs, fine-silty, mixed, thermic

Slope: Level, 0 to 1 percent

Drainage: Somewhat poorly drained

Samples collected by: D. A. Brown, J. V. Pettiet, & James Gray

On: March 18, 1958

Morphological description by: James Gray and Marvin Lawson

Hor.	Depth	
Ap1	0-4"	Very dark grayish brown (10YR 3/2) loam; weak fine granular structure; very friable; few fine to medium dark concretions; many roots and common pores; slightly acid; abrupt smooth boundary.
Ap2	4-9"	Dark grayish brown (10YR 4/2) loam; weak medium subangular blocky structure; friable to firm; many fine to coarse dark concretions; common roots and pores; slightly acid; abrupt wavy boundary.
B21tg	9-23"	Grayish brown (10YR 5/2) silt loam with few medium distinct dark brown and gray silt pockets and crack fills; weak coarse subangular blocky structure; firm; common coarse dark concretions; patchy clay skins on peds; few roots and pores; slightly acid; clear wavy boundary.
B22tg	23-29"	Gray (10YR 6/1) silt loam with many coarse distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; firm; common medium to coarse dark concretions and splotches; sand pockets and crack fills; patchy clay films on peds; few roots and common pores; slightly acid; abrupt wavy boundary.
B3g	29-44"	Gray (10YR 6/1) silty clay loam with many coarse distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; common medium to coarse dark concretions; few roots and common pores; patchy clay films; strongly acid; abrupt wavy boundary.
IICg	44-50+"	Light brownish gray (10YR 6/2) sandy clay loam; structureless; friable; common fine to medium concretions; medium acid.

Appendix Table 7.

Soil Series Dundee loam Location Mississippi Co., Arkansas

Pedon No. 13 Laboratory No. 101-106

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20µ	% Silt M 20-5µ	% Silt F 5-2µ	% Silt Total	% Clay 2-0.2µ	% Clay 0.2µ	% Clay Total	Text. Class
Ap1	0- 4	39.5				44.2			16.3	l
Ap2	4- 9	37.9				41.4			20.7	l
B21tg	9-23	16.7				63.5			19.8	sil
B22tg	23-29	15.8				63.1			21.1	sil
B3g	29-44	13.7				57.5			28.8	sicl
IICg	44-50+	49.1				26.7			24.2	scl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap1	1.68	6.5		8.88	3.20	1.50	.26	.25	3.67	59	54
Ap2	1.53	6.4		9.49	3.36	1.61	.28	.19	4.05	57	32
B21tg	0.40	6.5		7.99	2.60	1.87	.29	.08	3.15	61	38
B22tg	0.22	6.2		7.48	2.24	2.06	.57	.14	2.47	67	30
B3g	0.36	4.9		19.08	3.29	4.86	.70	.25	9.98	48	28
IICg	0.28	5.9		14.42	3.74	4.51	.74	.26	5.43	64	22

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension(Bar) 0	1/3	2/3	1	3	5	15 *	Avail. Water In./In.	Bulk Density	Porosity %
Ap1		13.0					4.3	0.14	1.65	38
Ap2		13.0					4.8	0.13	1.58	40
B21g		13.7					5.2	0.14	1.63	38
B22g		13.9					4.1	0.17	1.73	35
B3g		22.6					11.4	0.19	1.66	37
IICg		18.8					8.6	0.16	1.56	41

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2µ	Clay Fraction 2.0-0.2µ (Coarse)	Clay Fraction 0.2-0.08µ (Medium)	Clay Fraction <0.08µ (Fine)
Ap1	Q1 I2 PF3 KF3 K3	I2 M2 Q2 K3	M1 I3	M1 A2
Ap2	Q1 I2 PF3 KF3 K3	I1 M2 Q2 K3	M1 I3 Q3	M1 A2
B21g	Q1 I2 PF3 KF3 K3	Q1 I2 M3 K3	M1 I2	M1 A2
B22g	Q1 PF3 KF3 I3 K3	I1 Q2 M2	M1 K3 I3	M1 A2
B3g	Q1 PF3 KF3 I3 K3	M1 Q3 I3 K3	M1 I2	M1 A2
IICg	Q1 PF3 KF3 I3 K3	M1 I2 K3 Q3	M1 I2	M1 A2

* Values for disturbed cores.

ROBINSONVILLE FINE SANDY LOAM

Location: Woodruff Co., Ark., 1/2 mi south of Tupelo-Augusta hw. SW 1/4, SE 1/4, Sec. 4, T8N, R3W, Photo 1S-2N-199

Pedon No.: 14

Classification: Typic Udofluvents, coarse-loamy, mixed, nonacid, thermic

Slope: 1 to 3 percent — Drainage: Well drained

Samples collected by: M. E. Horn, D. A. Brown, & R. E. Phillips
On: Nov. 15, 1961

Morphological description by: Marvin Lawson

Hor.	Depth	
Ap	0-6"	Dark brown (7.5YR 3/2) fine sandy loam; weak coarse granular in 0-3" layer, massive (plowpan) in 3-6" layer; very friable in 0-3" layer, firm in 3-6" layer; neutral; abrupt smooth boundary.
A12	6-18"	Dark brown (7.5YR 3/2) fine sandy loam with common medium spots of dark brown; structureless; very friable; common fine roots; neutral; gradual wavy boundary.
C1	18-30"	Dark brown (7.5YR 3/4) fine sandy loam; structureless; has bedding planes; friable; common medium pores, common fine roots; many black sand-size grains, few fine concretions; neutral; gradual smooth boundary.
C2	30-41"	Dark brown (7.5YR 4/4) loamy fine sand; structureless; has bedding planes; friable; few fine pores; common black sand-size grains.
C3	41-58+"	Dark brown (7.5YR 4/4) fine sandy loam; massive; very friable; neutral.

Appendix Table 8.

Soil Series Robinsonville fine sandy loam Location Woodruff Co., Arkansas

Pedon No. 14 Laboratory No.

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 6	71.7				21.1			7.2	fsl
A12	6-18	72.4	12.84	5.99	1.57	20.4			7.2	fsl
C1	18-30	71.7				20.3			8.0	sl
C2	30-41	82.0	1.51	6.05	1.44	9.0			9.0	ls
C3	41-58+	67.4	10.73	8.98	3.89	23.6			9.0	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exch. Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.81	6.6	5.3	5.15	3.33	0.99	1.14	0.47	---	115	88
A12	0.27	6.7	5.4	4.55	3.54	1.50	1.06	0.26	---	140	78
C1	0.47	7.0	5.3	4.95	4.85	1.33	1.67	0.41	---	167	54
C2	0.53	6.9	5.5	6.43	5.61	1.85	1.69	0.42	---	149	48
C3	0.40	6.7	5.5	6.83	5.10	1.84	1.60	0.36	---	130	24

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	26.5	12.3	7.8	7.2	6.3	5.8	3.5	0.13	1.48	45
A12	26.6	10.9	8.1	7.4	5.7	4.8	3.8	0.11	1.47	45
C1	26.1	13.0	10.9	8.7	7.0	5.8	4.4	0.13	1.55	42
C2	26.4	14.0	12.3	9.8	8.6	7.4	6.0	0.12	1.56	41
C3	26.8	12.1	10.8	7.3	6.8	5.8	4.7	0.11	1.53	42

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap	I1 Q2 PF3 KF3 K3	I1 K2 (I/V)3 03	I2 M2 K3 I3 V3	M1 A2
A12	I1 Q2 PF3 KF3 K3	I1 M2 K3 (I/V)3 Q3	M2 I2 K3 I3 V3	M1 A2
C1	I1 Q2 PF3 KF3 V3	I2 M2 K3 (I/V)3 Q3	M1 V2 I3 K3 V3	M1 A2
C2	I1 Q2 PF3 KF3 V3	I2 M2 K3 (I/V)3 03	M1 V2 I3 K3 V3	M1 A2
C3	I1 Q2 PF3 KF3 V3	I2 M2 K3 (I/V)3 03	M1 V2 I3 K3 V3	M1 A2

* Values for non-disturbed cores; all other values are for disturbed samples.

TUTWILER FINE SANDY LOAM

Location: Jackson Co., Ark., 1/4 mi west Hw 67 at Campbell. SE 1/4, SW 1/4, Sec. 18, T12N, R2W, Photo Ins-3N-63

Pedon No.: 15

Classification: Typic Hapludalfs, coarse-silty, mixed, thermic

Slope: 0 to 1 percent

Drainage: Moderately well drained

Samples collected by: D. A. Brown and J. V. Pettiet

On Nov. 16, 1961

Morphological description by: Marvin Lawson

Hor.	Depth	
Ap	0-7"	Brown (10YR 4/3) fine sandy loam; weak medium granular structure; very friable; few medium concretions; common roots; strongly acid; abrupt smooth boundary parallel to tillage direction.
B1	7-12"	Dark brown (10YR 3/3) fine sandy loam; weak medium subangular blocky structure; very friable; few medium concretions; few roots; medium acid; clear smooth boundary.
B2t	12-18"	Brown (10YR 5/3) loam; weak medium subangular blocky structure; friable, slightly sticky; thin patchy clay films; sand grains coated and bridged; common medium concretions; few roots; medium acid; clear wavy boundary.
B3	18-36"	Mottled pale brown (10YR 6/3), brown (10YR 5/3), yellowish brown (10YR 5/4), and light brownish gray (10YR 6/2) sandy loam; weak medium subangular blocky structure; no roots; common medium and few coarse concretions; sand grains coated and bridged with clay; few fin and medium pores; medium acid; clear wavy boundary.
C	36-48+"	Dark brown (10YR 4/3) fine sandy loam with common medium and coarse distinct mottles of light brownish gray (10YR 6/2); massive with some lines of stratification showing; common medium concretions; no roots; few medium pores; very strongly acid.

Remarks: Soil was moist when sampled.
Colors given are for moist soil.
pH was not read in the field but was checked when site was located for acid profile.
James E. Hoelscher and George Dalke assisted with descriptive material.

Appendix Table 9.

Soil Series Tutwiler fine sandy loam Location Jackson Co., Arkansas

Pedon No. 15 Laboratory No. 187-191

PHYSICAL DATA

Hor-izon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 7	69.2				25.6			5.2	sl
B1	7-12	55.8				33.5			10.7	sl
B2t	12-18	50.3	17.65	10.29	1.96	29.9			19.8	l
B3	18-36	62.2	11.11	10.63	3.27	25.0			12.8	sl
C	36-48+	73.4	6.05	3.85	2.00	11.9			14.7	sl

CHEMICAL DATA

Hor-izon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.60	5.3	4.1	3.92	1.01	0.82	0.61	0.31	1.17	70	72
B1	0.40	5.8	4.4	3.03	2.42	0.67	0.97	0.41	---	148	78
B2t	0.20	5.8	4.5	4.04	3.13	0.83	0.97	0.31	---	130	68
B3	0.07	5.6	4.3	7.68	5.22	2.53	1.25	0.42	---	123	72
C	0.20	4.1	4.6	5.82	2.66	3.02	0.80	0.31	---	117	48

MOISTURE AND BULK DENSITY DATA

Hor-izon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Den-sity	Poro-sity %
Ap	28.3	9.4	7.2	4.6	3.0	2.2	1.6	0.11	1.45	45
B1	23.0	12.8	10.8	9.8	6.6	5.1	4.4	0.14	1.70	36
B2t	28.5	14.1	11.9	10.5	7.9	6.3	3.1	0.17	1.49	44
B3	----	21.0	----	15.0	11.4	10.7	8.5	0.22	1.74	34
C	----	15.4	----	10.2	8.4	8.0	6.5	0.14	1.56	41

MINERALOGICAL DATA

Hor-izon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap	Q1 KF3 PF3 I3 V3	M2 I2 K3 V3 Q3	M1 I3 V3 A3	M1 A2
B1	Q1 KF3 PF3 I3 V3	M2 I2 K3 V3 Q3	M1 I3 V3 A3	M1 A2
B2t	Q1 KF3 PF3 I3 K3	M2 I2	M1 I3 V3 A3	M1 A2
B3	Q1 KF3 PF3 I3 M3	M2 I2 K3 V3 Q3	M1 I3 V3 A3	M1 A2
C	Q1 KF3 PF3 I3 M3	M2 I2 K3 V3 Q3	M1 I3 V3 A3	M1 A2

* Values for non-disturbed cores; all other values are for disturbed samples.

UNDESIGNATED SERIES

(sampled as Tutwiler Fine Sandy Loam)

Location: Woodruff Co., Ark., 3 mi south and 2 mi west of Overcup; 100 ft south of Overcup road. NW 1/4, NW 1/4, Sec. 24, T8N, R3W, Photo Ins. 2N-113

Pedon No.: 16

Classification: Typic Hapludalfs, coarse-silty, mixed, thermic

Slope: About 1 percent

Drainage: Well drained

Samples collected by: M. E. Horn, D. A. Brown, & R. E. Phillips

On: Nov. 15, 1961

Morphological description by: Marvin Lawson

Hor.	Depth	
Ap	0-6"	Brown (10YR 5/3) fine sandy loam; weak medium granular structure; very friable; medium acid; abrupt wavy boundary (across tillage lines).
B1	6-12"	Brown (10YR 5/3) loam; weak medium subangular blocky structure; compact, firm (plow pan); few thin clay films; slightly acid; clear smooth boundary.
B2t B2 (1) B2 (2)	12-36" 12-20" 20-36"	Dark brown (10YR 4/3) silt loam with few medium pale brown mottles; weak medium subangular blocky structure; friable; common medium vesicles and pores; few patchy clay films; sand grains coated and bridged; few fine concretions; medium acid; gradual wavy boundary.
B3t	36-48+"	Mottled about equally with medium and coarse gray (10YR 6/1) and dark brown (10YR 4/3) sandy loam; weak medium subangular blocky structure; friable; few medium pores; few patchy clay films; common fine black concretions; very strongly acid; clear wavy boundary.

Appendix Table 10.

Soil Series Tutwiler, fine sandy loam Location Woodruff, Arkansas

Pedon No. 16 Laboratory No. 171-181

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap	0- 6	54.0	20.71	18.91	4.37	44.0			2.0	sl
B1	6-12	44.0	21.64	19.29	5.07	46.0			10.0	l
B2t	12-20	33.1	39.74	6.88	8.39	55.0			11.9	sil
B22t	20-36	47.3	25.68	8.18	2.84	36.7			16.0	l
B3t	36-48+	54.3	23.32	4.06	2.33	29.7			16.0	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.79	5.6	4.4	3.42	1.41	0.99	0.87	0.48	--	110	68
A2	0.46	6.2	4.5	4.94	2.32	1.00	0.88	0.31	0.43	91	64
B21t	0.40	5.5	4.1	5.81	3.26	1.35	0.98	0.20	0.02	100	54
B22t	0.39	5.0	4.5	13.54	3.59	2.02	1.16	0.32	6.45	52	50
B3t	0.33	4.8	3.4	15.45	3.50	2.37	1.08	0.32	8.18	47	42

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	---	6.7	---	3.3	2.4	2.3	2.2	0.07	1.48	44
B1	20.8	14.9	12.1	9.9	6.7	5.3	3.5	0.19	1.69	36
B2t	26.2	16.9	14.5	12.3	8.5	7.1	4.8	0.21	1.62	39
B22t	---	19.7	14.6	13.3	10.0	8.6	7.0	0.20	1.58	40
B3t	---	18.1	---	13.4	9.9	8.6	6.8	0.17	1.54	42

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap	-----	M2 I2 K3 V3	M1 I3 V3 A3	M1 A2
B1	-----	M2 I2 K3 V3	M1 I3 V3 A3	M1 A2
B2t	-----	M2 I2 K3 V3	M1 I3 V3 A3	M1 A2
B22t	-----	M2 I2 K3 V3	M1 I3 V3 A3	M1 A2
B3t		M2 I2 K3 V3	M1 I3 V3 A3	M1 A2

* Values for non-disturbed cores; all other values are for disturbed samples.

BRUIN LOAM

Location: Washington Co., Miss., Tate Farm, T18N, R7W, Sec. 11, SW 1/4, NE 1/4, Sheet 13, Washington Co. Soil Survey

Pedon No.: 20

Classification: Fluvaquentic Eutrochrepts, coarse-silty, mixed, thermic

Slope: Nearly level

Drainage: Moderately well drained

Samples collected by: D. A. Brown and R. E. Phillips

On: May 14, 1962

Morphological description by: M. E. Horn

Hor.	Depth	
Ap	0-7"	Dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; few micro- and fine pores; slightly acid; gradual wavy boundary.
B21	7-16"	Dark brown (10YR 3/3) loam with few faint mottles of very dark grayish brown and a few distinct mottles of yellowish brown; moderate medium subangular blocky; friable to firm, common fine pores; slightly acid; gradual smooth boundary.
B22	16-24"	Dark grayish brown (10YR 4/2) loam with common distinct medium mottles of dark gray and yellowish brown; moderate medium to coarse subangular blocky structure; friable to firm; common fine to medium pores; slightly acid; gradual smooth boundary.
C	24-43+"	Dark yellowish brown (10YR 4/4) sandy loam with common faint fine mottles of grayish brown and yellowish brown; structureless; friable; common fine pores; slightly acid.

Remarks: Colors are for moist soil.
Frank Scott assisted in locating site.

Appendix Table 11.

Soil Series Bruin loam Location Washington Co., Mississippi

Pedon No. 20 Laboratory No. 233-237

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap	0- 7	34.3	22.2	17.9	4.0	44.1	6.3	11.8	18.1	1
B21	7-16	49.5	17.4	13.9	2.0	33.3	5.9	15.1	15.1	1
B22	16-24	44.7	26.1	14.3	1.4	41.8	4.5	12.3	12.3	1
C	24-36	61.6	13.8	9.5	1.4	24.7	4.5	12.2	12.2	sl
C	36-43+	54.1	15.8	12.6	1.6	30.0	5.7	13.2	13.2	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.94	6.1	4.5	15.3	8.0	3.5	.14	.42	4.0	78	46
B21	0.73	6.3	4.7	19.3	10.4	5.3	.20	.34	3.6	84	34
B22	0.93	6.2	4.5	22.3	10.4	7.0	.26	.40	5.0	79	30
C	0.20	6.4	4.7	14.5	6.0	1.8	.22	.32	3.2	57	25
C	0.40	6.6	4.8	12.3	6.8	4.3	.21	.40	3.4	95	16

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	34.8	19.5	16.7	13.0	9.7	8.3	6.4	0.18	1.37	48
B21	33.7	19.8	16.1	15.4	11.4	9.6	7.7	0.17	1.39	48
B22	35.3	24.0	22.2	----	15.1	11.8	9.3	0.21	1.40	47
C	37.8	17.0	13.9	----	8.5	6.7	6.0	0.15	1.35	49
C	----	----	----	----	9.3	7.7	6.3	----	----	--

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap	M2I2Q2K3V3C3C/V3F3	M1 I2 K3 Q3 C/V3	M1 C/V2 I3 K3	
B21	M2I2Q3K3V3C3C/V3F3	M1 I2 K3 Q3 C/V3	M1 C/V2 I3 K3	
B22	M2I2Q3K3V3C3C/V3F3	M1 I2 K3 Q3 C/V3	M1 C/V2 I3 K3	
C	M2I2Q3K3V3C3C/V3F3	M1 I2 K3 Q3 C/V3	M1 C/V2 I3 K3	
C	M2I2Q3K3V3C3C/V3F3	M1 I2 K3 Q3 C/V3	M1 C/V2 I3 K3	

* Values for non-disturbed cores; all other values are for disturbed samples.

COMMERCE LOAM

Location: Washington Co., Miss., Pittman farm; SE 1/4, SW 1/4, NE 1/4, Sec. 33, T18N, R8W, Sheet 12, Washington County Soil Survey

Pedon No.: 21

Classification: Aeric Fluvaquentic, fine-silty, mixed, non-acid thermic

Slope: Nearly level

Drainage: Somewhat poorly to moderately drained

Samples collected by: V. E. Nash, D. A. Brown, & R. E. Phillips

On: May 14, 1962

Morphological description by: M. E. Horn

Hor.	Depth	
Ap	0-7"	Dark grayish brown (10YR 4/2) loam; weak fine granular structure; very friable; common micro- and fine pores; slightly acid; gradual wavy boundary.
B	7-20"	Dark grayish brown (10YR 4/2) loam with common fine to medium distinct mottles of dark yellowish brown and yellowish brown; moderate medium subangular blocky structure;friable; common micro- and very fine pores; slightly acid; gradual wavy boundary.
C	20-38+"	Grayish brown (10YR 5/2) heavy loam with common medium distinct yellowish brown mottles; structureless; friable; common micro- and very fine pores; moderately alkaline.

Remarks: Colors are for moist soil.

Appendix Table 12.

Soil Series Commerce loam — Location Washington Co., Mississippi

Pedon No. 21 — Laboratory No. 242-245

PHYSICAL DATA

Hor-izon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 7	49.9	19.8	11.2	1.6	32.6	6.6	6.4	13.0	1
B(1)	7-13	47.1	22.8	12.8	2.2	37.8	9.3	6.5	15.8	1
B(2)	13-20	37.7	19.4	15.7	3.4	38.5	12.0	7.9	19.9	1
C	20-38+	42.8	19.8	15.9	2.6	38.3	10.0	6.1	16.1	1

CHEMICAL DATA

Hor-izon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.87	6.1	4.2	12.5	6.9	3.4	.09	.41	4.3	86	58
B(1)	0.67	6.3	4.5	15.7	8.5	3.8	.10	.38	4.5	82	34
B(2)	0.73	6.8	4.9	17.5	9.7	7.5	.14	.28	4.1	101	25
C	0.27	8.0	6.6	19.5	10.8	7.9	.24	.28	1.6	99	15

MOISTURE AND BULK DENSITY DATA

Hor-izon	% Water retained at specified tension (Bar) 0*	1/3*	2/3*	1	3	5	15	Avail. Water In./In.	Bulk Den-sity	Poro-sity %
Ap	37.4	18.3	16.2	11.6	8.3	6.7	5.5	0.17	1.32	50
B(1)	27.1	19.0	16.8	15.2	11.3	9.2	5.3	0.21	1.53	42
B(2)	31.0	21.9	19.7	----	14.4	----	10.2	0.17	1.44	46
C	32.0	16.0	12.2	----	11.5	10.2	7.9	0.12	1.43	46

MINERALOGICAL DATA

Hor-izon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap	M2 V2 I2 Q2 K3 C3 F3	M1 I2 K3 V3 Q3 C/V3	M1 C/V2 I3 K3	
B(1)	M2 V2 I2 Q2 K3 C3 F3	M1 I2 K3 V3 Q3 C/V3	M1 C/V2 I3 K3	
B(2)	M2 V2 I2 Q3 K3 C3 F3	M1 I2 K3 V3 Q3 C/V3	M1 C/V2 I3 K3	
C	M2 V2 I2 Q2 K3 C3 F3	M1 I2 K3 V3 Q3 C/V3	M1 C/V2 I3 K3	

* Values for non-disturbed cores; all other values are for disturbed samples.

DUNDEE

Location: Coahoma County, Miss., T25N, R3W, Sec. 24, N 1/4, SW 1/4, Sheet 57, Coahoma County Soil Survey

Pedon No.: 22

Classification: Aeric Ochraqualfs, fine-silty, mixed, thermic

Slope: Nearly level, 0 to 1 percent   Drainage: Somewhat poorly drained

Samples collected by: D. A. Brown, R. E. Phillips, & M. E. Horn
On: April 8, 1962

Morphological description by: M. E. Horn and H. B. Vanderford

Hor.	Depth	
Ap	0-6"	Very dark grayish brown (10YR 3/2) to dark brown loam; weak fine granular; friable; few fine and medium pores; common fine roots; neutral clear smooth boundary.
B21t	6-18"	Dark grayish brown (10YR 4/2) heavy loam with common distinct medium mottles of yellowish brown; moderate medium subangular blocky structure; firm; common thin continuous clay films; many fine pores; many fine roots; strongly acid; gradual wavy boundary.
B22t	18-30"	Dark grayish brown (10YR 4/2) to brown heavy loam with many fine distinct mottles of yellowish brown; weak medium subangular structure; firm; few very thin patchy clay films in upper part; many very fine vesicular pores; few to common very fine roots; strongly acid; gradual smooth boundary.
B3	30-44"	Grayish brown (10YR 5/2) loam with many fine distinct mottles of yellowish brown; structureless; friable; many very fine to fine vesicular pores; strongly acid; clear smooth boundary.
C	44-48+"	Light grayish brown (10YR 6/2) fine sandy loam with common fine distinct mottles of yellowish brown; structureless; friable; many very fine and fine vesicular pores; medium acid.

Remarks: Colors are for moist soil.
Frank Scott assisted in locating sample site.

Appendix Table 13.

Soil Series Dundee, loam Location Coahoma, Mississippi

Pedon No. 22 Laboratory No. 219-223

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20µ	M 20-5µ	F 5-2µ	Total	% Clay 2-0.2µ	0.2µ	Total	Text. Class
Ap	0- 6	45.8	31.4	9.6	0.9	41.9	5.0	5.9	10.9	1
B21t	6-18	39.5	27.1	11.2	0.6	38.9	7.7	10.4	18.1	1
B22t	18-30	39.2	27.3	14.1	0.9	42.3	8.0	8.9	16.9	1
B3	30-44	49.1	22.4	12.8	0.9	36.1	6.8	6.5	13.3	1
C	44-48+	56.9	21.7	9.1	1.6	32.4	6.5	5.0	11.5	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	1.20	7.18	6.2	16.3	11.0	2.0	.04	.31	2.5	82	48
B21t	0.86	5.22	3.4	18.5	9.8	0.6	.12	.36	7.6	59	44
B22t	0.60	5.14	3.8	16.5	7.6	1.9	.19	.33	6.1	61	39
B3	0.20	5.39	3.7	14.3	7.0	3.1	.31	.33	4.4	75	40
C	0.27	5.81	3.9	14.0	5.8	2.1	.25	.29	3.5	61	42

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension(Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	28.7	16.6	14.7	12.2	7.8	7.6	5.4	0.16	1.45	45
B21t	30.1	21.5	18.9	17.5	12.3	10.1	8.3	0.19	1.44	46
B22t	33.1	20.3	16.6	15.1	10.5	8.7	7.6	0.18	1.39	48
B3	30.4	20.0	16.9	13.7	9.2	8.0	6.6	0.20	1.47	45
C	----	----	----	----	7.9	7.4	5.7	----	----	--

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2µ	Clay Fraction 2.0-0.2µ (Coarse)	0.2-0.08µ (Medium)	<0.08µ (Fine)
Ap	M2 V2 Q2 I2 K3 C3	M1 I2 C/V2 K3 Q3	M1 C/V2 I3 K3	
B21t	M2 V2 Q2 I3 K3 C3	M1 I2 C/V2 K3 Q3	M1 C/V2 I3 K3	
B22t	M2 V2 Q2 I2 K3 C3	M1 I2 C/V2 K3 Q3	M1 C/V2 I3 K3	
B3	M2 V2 Q2 I2 K3 C3	M1 I2 C/V2 K3 Q3	M1 C/V2 I3 K3	
C	M2 V2 Q2 I2 K3 C3	M1 I2 C/V2 K3 Q3	M1 C/V2 I3 K3	

* Values for non-disturbed cores; all other values are for disturbed samples.

DUBBS FINE SANDY LOAM

Location: Coahoma County, Miss., NW 1/4, SW 1/4, Sec. 36, T26N, R3W, Sheet 51 Coahoma County Soil Survey

Pedon No.: 23

Classification: Typic Hapuldalfs, fine-silty, mixed, thermic

Slope: Nearly level

Drainage: Moderately well to well drained

Samples collected by: D. A. Brown, R. E. Phillips, & M. E. Horn

On: April 8, 1962

Morphological description by: M. E. Horn and H. B. Vanderford

Hor.	Depth	
Ap	0-7"	Dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; many fine and medium roots and pores; clear smooth boundary.
B2t	7-22"	Dark brown (10YR 4/3-3/3) heavy loam; moderate medium to coarse subangular blocky structure; friable to firm; many fine and medium pores; many very fine and fine roots; thin continuous clay films on vertical ped faces; slightly acid; gradual wavy boundary.
B3	22-31"	Dark yellowish brown (10YR 4/4) to yellowish brown (10YR 5/4) fine sandy loam; weak coarse subangular blocky structure; friable; thin clay films on walls of old root channels; common very fine and fine pores; few very fine roots; gradual wavy boundary.
C1	31-43"	Yellowish brown (10YR 5/4) fine sandy loam with common medium faint mottles of pale brown; weak coarse subangular blocky structure; friable; common very fine and fine pores; few very fine roots; strongly acid; gradual wavy boundary.
C2	43-53+"	Mottled yellowish brown (10YR 5/4) and pale brown (10YR 6/3) sandy loam; structureless; friable; many very fine and fine pores; medium acid.

Remarks: Colors are for moist soil.
Moderate traffic pan, 4 to 5 inches thick, in base of Ap extending into B2.
Frank Scott assisted in locating sample site.

Appendix Table 14.

Soil Series Dubbs fine sandy loam Location Coahoma, Mississippi

Pedon No. 23 Laboratory No. 214-218

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 7	56.7	14.3	12.7	0.9	27.9	10.5	3.6	14.1	sl
B2t	7-22	46.4	16.0	15.3	0.9	32.8	17.0	4.3	21.3	l
B3	22-31	67.8	3.5	4.2	1.2	8.9	12.1	3.3	15.4	sl
C1	31-43	61.6	17.3	10.6	1.4	29.3	10.2	2.5	12.7	sl
C2	43-53+	56.0	13.8	8.3	1.7	23.8	12.6	2.6	15.2	sl

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	1.06	6.5	4.2	13.3	7.0	1.6	.07	.38	2.8	68	68
B2t	0.80	6.1	4.2	17.8	10.2	2.5	.19	.33	5.7	74	45
B3	0.39	6.2	4.9	24.8	10.0	9.4	2.43	.87	1.1	90	35
C1	0.20	5.4	3.5	14.5	7.8	1.7	.31	.26	5.2	56	32
C2	0.33	5.6	3.6	14.0	7.6	1.8	.26	.21	4.6	71	28

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	30.6	20.3	17.0	12.5	9.3	7.7	5.0	0.23	1.41	47
B2t	30.4	21.9	19.1	17.6	13.2	12.5	8.8	0.19	1.48	44
B3	32.4	20.8	18.0	16.6	12.8	11.2	8.7	0.17	1.44	46
C1	35.2	18.5	15.4	12.0	8.9	7.8	6.5	0.17	1.41	47
C2	----	----	----	11.7	8.2	7.5	6.5	----	1.40	47

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap	M2 Q2 I2 V3 K3 F3 C3	M1 I2 C/V2 Q3 K3	M1 C/V2 I3 K3	
B2t	M2 Q2 I2 V3 K3 F3 C3	M1 I2 C/V2 Q3 K3	M1 C/V2 I3 K3	
B3	M2 Q2 I3 V3 K3 F3 C3	M1 I2 C/V2 Q3 K3	M1 C/V2 I3 K3	
C1	M2 Q2 I2 V3 K3 F3 C3	M1 I2 C/V2 Q3 K3	M1 C/V2 I3 K3	
C2	M2 Q2 I2 V3 K3 F3 C3	M1 I2 C/V2 Q3 K3	M1 C/V2 I3 K3	

* Values for non-disturbed cores; all other values are for disturbed samples.

DUNDEE SILT LOAM

Location: Washington Co., Miss., on Hw 82, about 5 mi east of Leland on Jessie Reed Farm, T18N, R6W, Sec. 10, SW 1/4, NW 1/4, SE 1/4, Sheet 15, Washington County Soil Survey

Pedon No.: 24

Classification: Aeric Ochraqualfs, fine-silty, mixed, thermic

Slope: Nearly level

Drainage: Somewhat poorly drained

Samples collected by: D. A. Brown, V. E. Nash, & R. E. Phillips
On: May 14, 1962

Morphological description by: M. E. Horn

Hor.	Depth	
Ap	0-5"	Grayish brown (10YR 5/2) silt loam with few medium faint mottles of yellowish brown; moderate medium granular structure; friable to firm: few fine pores; few very fine reddish-brown concretions; slightly acid; clear smooth boundary.
B21t	5-22"	Grayish brown (10YR 5/2) silty clay loam with common medium distinct mottles of yellowish brown and a few medium faint gray; moderate medium prismatic breaking to moderate medium subangular blocky structure; firm; common fine iron-manganese concretions; continuous clay films on ped surfaces; slightly acid; gradual smooth boundary.
B22t	22-38+"	Gray (10YR 6/1) heavy silt loam with common medium and coarse distinct mottles of yellowish brown; moderate to strong prismatic structure; firm; prominent clay films on vertical ped faces and completely filling voids; slightly acid.

Remarks: Colors are for moist soil.
Frank Scott assisted in locating the site.

Appendix Table 15.

Soil Series Dundee silt loam Location Washington Co., Mississippi

Pedon No. 24 Laboratory No. 238-240

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0- 5	10.8	32.0	27.9	2.8	62.7	11.5	10.5	21.8	sil
B21t(1)	5-12	6.0	26.5	31.9	3.3	61.7	16.4	12.4	28.8	sicl
B21t(2)	12-22	4.8	25.7	33.0	3.3	65.3	18.4	12.1	30.5	sicl
B22t	22-38+	6.7	31.5	31.1	2.0	65.2	16.2	8.4	24.6	sil

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.
Ap	0.87	6.1	4.0	16.5	8.2	3.6	.09	.42	5.9	75	55
B2(1)	0.47	6.1	3.7	19.5	9.1	7.3	.20	.24	6.6	86	48
B2(2)	0.23	6.1	3.6	22.0	9.7	7.9	.26	.37	6.9	83	42
B22t	0.07	6.4	4.2	21.0	9.9	4.1	.24	.32	5.1	70	31

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0 *	1/3 *	2/3 *	1	3	5	15	Avail. Water In./In.	Bulk Density	Porosity %
Ap	20.9	21.8	19.8	18.3	13.6	11.8	9.1	0.19	1.46	45
B2(1)	27.8	24.3	23.5	25.1	19.1	16.7	13.2	0.17	1.55	42
B2(2)	32.2	24.5	23.1	28.7	20.6	17.9	14.3	0.16	1.54	42
B22t	----	----	----	----	17.9	15.8	12.2	----	----	--

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap	Q2 I2 V3 K3 M3 C3 F3	M2 I2 C/V3 K3 Q3	M1 C/V2 I3 K3	
B2(1)	Q2 I2 V3 K3 M3 C3 F2	M2 I2 C/V3 K3 Q3	M1 C/V2 I3 K3	
B2(2)	Q2I2V2K3M3C/V3C3F3	M2 I2 C/V3 K3 Q3	M1 C/V2 I3 K3	
B22t	Q2I2V2K3C/V3C3F3	M2 I2 C/V3 K3 Q3	M1 C/V2 I3 K3	

* Values for non-disturbed cores; all other values are for disturbed samples.

COMMERCE SILT LOAM

Location: Tensas Parish, La., Wilkerson farm, approx. 2-3/4 mi southeast of Newellton, 750 ft southeast of center of La. Hw 605, 1860 ft south-southwest of intersection of La. Hw 605 and 608, and 1650 ft southwest of La. Hw 608; Spanish Land Grant Sec. 14. T12N, R12E.
Photo CTO-2BB-122.

Pedon No.: 31

Classification: Aeric Fluraquents, fine-silty, mixed, nonacid, thermic

Slope: Near top of ridge with convex slope of about 1/2 percent

Drainage: Somewhat poorly drained, runoff slow

Samples collected by: J. DeMent, J. L. Walker, D. A. Brown, R. E. Phillips, & Billie Nutt

On: Oct. 28, 1963

Morphological description by: David F. Slusher and Tracey Weems

Hor.	Depth	
Ap	0-8"	Dark grayish brown (10YR 4/2) silt loam (high in very fine sand); weak very fine granular adhering as massive; friable; few roots; medium acid (pH 5.6); abrupt smooth boundary.
B2	8-18"	Very dark grayish brown (10YR 3/2) on ped surfaces; light silty clay loam; dark grayish brown with common fine faint dark yellowish brown (10YR 4/4) mottles and a few very dark grayish brown (10YR 3/2) streaks inside peds; moderate medium subangular blocky adhering inside peds; moderate medium subangular blocky adhering as weak medium prismatic; firm; few roots; few fine pores in peds; few fine dark brown aggregates; slightly acid (pH 6.5); clear smooth boundary.
B31	18-25"	Dark grayish brown (10YR 4/2) very fine sandy loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky; friable; a few roots; common fine pores in peds; very few dark brown aggregates; slightly acid (pH 6.5); clear smooth boundary.
B32	25-29"	Dark grayish brown (10YR 4/2) very fine sandy loam (coarser than horizon above); common fine distinct dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) mottles; weak medium subangular blocky; friable; few roots; common fine pores in peds; a few fine dark brown aggregates; slightly acid (pH 6.5); clear smooth boundary.
C1	29-35"	Grayish brown (10YR 5/2) very fine sandy loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; common fine pores; very few fine dark brown aggregates; neutral (pH 7.0); clear smooth boundary.
A1B1	35-36"	Dark grayish brown (10YR 4/2) light silty clay loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky; firm; few fine pores in peds; a few fine dark brown aggregates; neutral (pH 7.0); abrupt smooth boundary.
C2	36-46"	Grayish brown (10YR 5/2) very fine sandy loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; some areas have horizontal strata 1-2 mm. thick of dark grayish brown (10YR 4/2); massive with some horizontal cleavage; friable; a few fine dark brown aggregates; common fine and a few medium pores; neutral (pH 7.0); gradual smooth boundary.
C3	46-60"	Grayish brown (10YR 5/2) very fine sandy loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; has 1/2 to 1 mm. strate 1 to 2 mm. apart of dark grayish brown (10YR 4/2) throughout; massive with some horizontal cleavage; friable; moderately alkaline (pH 8.0); non-calcareous.
4/0	5-11"	Very fine sandy loam (not samples).
	11-28"	Dark gray (N 4/0) silty clay loam stratified with silty clay and clay (not samples).
	28"	Buried wood.

Remarks: One vertical krotovina of very dark grayish brown (10YR 3/2) light silty clay loam from 18 to 46".
Profile dry to 34 inches.
Munsell colors for moist soil unless otherwise indicated.
Reaction by Hellige-Truog field kit.

Soil temperature:	Depth	Degrees C.	Depth	Degrees C.
	10'	21.0	23'	18.5
	14'	20.7	25'	18.0
	19'	19.0	26'	18.2

Appendix Table 16.

Soil Series Commerce silt loam Location Tensas Parish, Louisiana

Pedon No. 31 Laboratory No. S63-LA-54-2(1-8)

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	M 20-5μ	F 5-2μ	Total	% Clay 2-0.2μ	0.2μ	Total	Text. Class
Ap	0-8	9.5				73.6			16.9	sil
B2	8-18	8.4				62.9			28.7	sicl
B31	18-25	30.9				54.3			14.8	sil
B32	25-29	31.3				51.6			17.1	sil
C1	29-35	30.7				54.4			14.9	sil
Alb1	35-36	8.6				65.6			25.8	sil
C2	36-46	26.8				60.4			12.8	sil
C3	46-60	39.8				49.2			11.0	l

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.	P_2 lb/A
Ap	1.31	5.7	4.8	14.2	9.0	3.2	0.1	0.6	5.2	71	46	460
B2	.91	6.2	4.9	21.1	16.2	4.9	0.2	0.6	5.1	81	24	360
B31	.34	6.4	4.8	12.8	9.6	3.2	0.2	0.3	3.1	81	32	460
B32	.34	6.4	4.9	13.5	9.6	3.7	0.2	0.4	3.3	81	32	440
C1	.41	6.4	4.8	13.2	9.6	3.6	0.2	0.4	3.6	79	32	460
Alb1	.64											
C2	.43	6.6	5.0	12.3	8.6	3.7	0.3	0.3	2.4	84	24	520
C3	.41	7.7	6.7	10.9	7.2	3.9	0.3	0.3	1.4	97	14	540

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension(Bar) 0	1/3*	2/3	1	3	5	15*	Avail. Water In./In.	Bulk Density	Porosity %
Ap		----					8.3	----	----	
B2		24.7					14.1	0.16	1.49	44
B31		20.0					8.1	0.16	1.37	48
B32		22.0					8.6	0.18	1.32	50
C1		20.8					8.1	0.17	1.34	49
Alb1		----					13.1	----	----	
C2		14.6					7.5	0.10	1.38	48
C3		22.7					5.6	0.22	1.32	50

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	0.2-0.08μ (Medium)	<0.08μ (Fine)
Ap		M2 I2 K3	M1 I3	
B2		---	--	
B31		M2 I2 K3	M1 I3	
B32		---	--	
C1		M2 I3 K3 Q3	M1	
Alb1		---	--	
C2		---	--	

*Values are for disturbed samples.

DUNDEE SILT LOAM

Location: Tensas Parish, La., Truman James farm, 8 mi west and 1 mi north of Waterproof, on west center of low ridge 1½ mi south of La. Hw 571, NE 1/4, Sec. 27, T10N, R9E.
Photo CTO-4BB-139 Pedon No.: 32

Classification: Aeric Ochraqualfs, fine-silty, mixed, thermic

Slope: One-half percent Drainage: Somewhat poorly drained

Samples collected by: J. DeMent, J. L. Walker, D. A. Brown, R. E. Phillips, & A. G. Caldwell On: Oct. 29, 1963

Morphological description by: D. F. Slusher, Tracey Weems, & S. A. Lytle

Hor.	Depth	
Ap	0-5"	Brown (10YR 4/3) silt loam; weak very fine granular adhering as coarse clods; friable; a few soft dark brown aggregates; roots common; medium acid (pH 5.8); abrupt smooth boundary.
B21t	5-9"	Dark grayish brown (10YR 4/2) light clay loam; many very dark grayish brown (10YR 3/2) streaks on ped surfaces and common fine distinct yellowish brown (10YR 4/4) mottles inside peds; weak medium subangular blocky; firm; distinct patchy clay films on vertical and horizontal ped surfaces; a few soft dark brown aggregates; very few fine pores; few roots; horizon appears compacted from traffic; strongly acid (pH 5.5); clear smooth boundary.
B22t	9-15"	Dark grayish brown (10YR 4/2) (60%) and very dark grayish brown (10YR 3/2) (40%) in ped surfaces; loam; dark grayish brown (10YR 4/2) with many fine distinct dark yellowish brown (10YR 4/4) mottles inside peds; moderate medium subangular blocky adhering as weak medium prismatic; firm; distinct almost continuous clay films on ped surfaces and in pores; common fine pores in peds; a few dark brown aggregates; few roots; strongly acid (pH 5.5); clear smooth boundary.
B23t	15-21"	Dark grayish brown (10YR 4/2) loam; very dark grayish brown (10YR 3/2) streaks (15%) on ped surfaces and common fine distinct dark yellowish brown (10YR 4/4) mottles inside peds; moderate medium subangular blocky adhering as weak medium prismatic; firm; distinct patchy clay films on ped surfaces and lining all fine pores; common fine pores; few roots; a few soft dark brown aggregates; strongly acid (pH 5.5); clear smooth boundary.
B31t	21-27"	Grayish brown (10YR 5/2) loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky adhering as weak coarse prismatic; firm; common thin patchy clay films on peds and in a few fine pores; few soft dark brown aggregates; few roots; few fine pores; medium acid (pH 5.8); abrupt smooth boundary.
B32t	27-34"	Grayish brown (10YR 5/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky; firm; few faint patchy clay films on peds and in some pores; a few soft dark brown aggregates; few fine pores in peds; a few roots; medium acid (pH 5/8); abrupt smooth boundary. From 30 to 31 inches was dark grayish brown (10YR 4/2) silty clay loam excluded from sample.

B33t 34-36" Dark grayish brown (10YR 4/2) on ped surfaces; heavy silty clay loam; grayish brown (10YR 5/2) with common fine distinct dark yellowish brown (10YR 4/4) mottles inside peds; moderate medium subangular blocky; firm; thin almost continuous clay films; a few soft black aggregates; few fine pores in peds; medium acid (pH 5.8); abrupt smooth boundary.

C1 36-40" Grayish brown (loYR 5/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few fine pores; few soft dark brown aggregates; medium acid (pH 5.8); abrupt smooth boundary.

C2 40-43" Grayish brown (10YR 5/2) medium silty clay loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine subangular blocky; firm; few faint patchy clay films; few fine pores; few fine soft dark brown aggregates; medium acid (pH 5.8); abrupt smooth boundary.

C3 43-55" Grayish brown (10YR 5/2) loam; many fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few fine pores; few soft dark brown aggregates; medium acid (pH 5.8); abrupt smooth boundary.

C4 55-66" Gray (10YR 5/1) light silty clay; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky; firm; a few soft black aggregates and patchy black stains on peds; few fine pores in peds; medium acid (pH 5.8); abrupt smooth boundary.

C5 66-74" Grayish brown (10YR 5/2) light silt loam; many fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; very few fine pores; medium acid (pH 6.0).

74-150" Dominantly silt loam and very fine sandy loam (not sampled).
12½-21' Loamy sand (not sampled).
21-22' Clay (not sampled).
22-25' Greenish loam (not sampled).

Remarks: From 43 to 55 inches was a very dark grayish brown silt loam krotovina 1 to 2 inches in diameter.
Profile dry to 55 inches. Free water at 12½ feet.
Munsell colors for moist soil.
Reaction by Hellige-Truog field kit.
Soil temperature:

Depth	Degrees C.	Depth	Degrees C.
4'	24.2	19'	20.5
9'	23.8	23'	19.6
14'	21.9	25'	19.8

Appendix Table 17.

Soil Series Dundee silt loam **Location** Tensas Parish, Louisiana

Pedon No. 32 **Laboratory No.** S63-LA-54-5(1-12)

PHYSICAL DATA

Horizon	Depth Inches	% Sand	% Silt C 50-20μ	% Silt M 20-5μ	% Silt F 5-2μ	% Silt Total	% Clay 2-0.2μ	% Clay 0.2μ	% Clay Total	Text. Class
Ap	0-5	33.1				50.6			16.3	sil
B21t	5-9	26.0				45.0			29.0	cl
B22t	9-15	37.9				36.9			25.2	l
B23t	15-21	50.7				28.9			20.4	l
B31t	21-27	47.5				32.9			19.6	l
B32t	27-34	21.5				54.5			24.0	sil
B33t	34-36	10.1				55.7			34.2	sicl
C1	36-40	26.1				54.5			19.4	sil

CHEMICAL DATA

Horizon	% O.M.	pH H_2O	pH KCl	C.E.C. me/100g. Soil	Exchangeable Cations me/100g. Ca	Mg	Na	K	H	% Base Satn.	P_1 lb/A.	P_2 lb/A
Ap	1.36	5.6	4.6	12.0	7.6	2.2	0.1	0.5	4.9	68	24	80
B21t	.91	5.5	4.2	19.5	12.7	3.4	0.3	0.6	7.5	69	24	80
B22t	.57	5.5	4.0	18.1	11.8	3.5	0.4	0.5	7.8	68	48	160
B23t	.41	5.6	4.1	15.5	10.1	3.1	0.4	0.4	6.3	69	62	280
B31t	.41	5.6	4.1	14.9	10.0	2.8	0.3	0.4	5.8	70	68	340
B32t	.36	5.4	4.0	18.1	12.3	3.5	0.4	0.5	6.5	72	72	240
B33t	.43	5.4	4.0	23.6	16.6	4.9	0.5	0.7	7.8	74	52	160
C1	.29	5.5	4.0	15.8	10.7	3.1	0.3	0.4	5.8	71	72	300

MOISTURE AND BULK DENSITY DATA

Horizon	% Water retained at specified tension (Bar) 0	1/3 *	2/3	1	3	5	15 *	Avail. Water In./In.	Bulk Density	Porosity %
Ap		15.7					6.6	0.14	1.53	42
B21t		19.7					12.2	0.12	1.57	41
B22t		20.0					11.2	0.12	1.41	47
B23t		15.7					9.8	0.09	1.49	44
B31t		18.2					9.2	0.13	1.46	45
B32t		23.0					11.8	0.16	1.40	47
B33t		34.6					16.2	0.24	1.30	51
C1		19.7					10.1	0.14	1.42	46

MINERALOGICAL DATA

Horizon	Silt Fraction 5-2μ	Clay Fraction 2.0-0.2μ (Coarse)	Clay Fraction 0.2-0.08μ (Medium)	Clay Fraction <0.08μ (Fine)
Ap		M2 I2 K3 $(VorC)_3$ Q3	M1	
B21t		---	--	
B22t		M1 I2 K3 $(VorC)_3$	M1	
B23t		---	--	
B31t		---	--	
B32t		---	--	
B33t		---	--	
C1		M1 I2 K3 Q3	M1	

*Values for disturbed samples